

The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

Vol. XXIII. No. 591

OCTOBER 25, 1930

Prepaid Annual Subscription
United Kingdom, £1.10: broad, £1.4.0

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

The prepaid subscription to THE CHEMICAL AGE is 21s. per annum for the United Kingdom, and 26s. abroad. Cheques, Money Orders, and Postal Orders should be made payable to Benn Brothers, Ltd.

Benn Brothers, Ltd., proprietors of THE CHEMICAL AGE, have for some years past adopted the five-day week, and the editorial and general offices (Bouverie House, 154, Fleet Street, London, E.C.4), are closed on Saturdays.

Telegrams: "Allangas, Fleet, London."

Telephone: City 0244

Lord Brotherton

THE death of Lord Brotherton is a loss which the chemical industry shares with the nation at large. By foresight and sheer force of character he had built up a great industry from practically nothing, he had achieved distinction in municipal, county and national affairs, and he was one of the country's great patrons of education. To his achievements in the field of chemistry tribute was paid at the annual meeting of the Society of Chemical Industry last July, when he was presented with the Messel Medal, the highest honour of the Society. An engraved address accompanied the medal recalling his important work in advancing the manufacture on a considerable scale of a large number of chemical products, and his encouragement of the teaching and training of chemists.

Of his widespread benefactions, the most memorable have been his gifts to the University of Leeds, in which he had always taken a keen interest and where he was chairman of the Advisory Committee on Pathology and Bacteriology. He had given £20,000 to found a Chair of Bacteriology, and followed it up in 1927 with £100,000 for the building of a Library as an integral part of the scheme for the extension of the University. He laid the foundation stone last June only a few days after he had announced his intention of bestowing on the University, and through it, on the nation, his

own priceless collection of books. The occasion called forth a deserved message from the King.

The Council of the University expressed a sincere tribute following the announcement of Lord Brotherton's death on Wednesday. "Rarely," states this resolution, "has a University had so princely a benefactor of learning: never has a University possessed a more faithful friend. His name gives honour to our roll of honorary graduates and his public life and work have enhanced the fame of the University."

Lord Brotherton has gone, but his example will long remain as a model, as much of the qualities required to gain success as of how to wear the mantle of success. His business creed he summarised in the course of his Messel lecture. If he were asked, he said after his review of the growth of his own undertaking, whether his views differed greatly to-day from those with which he originally set out, his answer would be "No." He believed that the factors commanding success then remained the same to-day, and he did not see any more hopeful basis for sound industrial progress than the free enterprise of men who would set themselves to the economic production of commodities vital to the world. If a man was working at his own risk he could put forward his energies with perfect freedom. Those were the conditions under which he had worked and which he preferred to-day above all others. He had an undiminished belief in the merits of the method of industrial enterprise in which competition, while not economically wasteful, was still sufficient to stimulate effort and to afford the healthy feeling that should exist between competing teams.

Filtration in Industry

THE practice of filtration has many highly interesting aspects. At the one extreme, it interests from the vastness of the task it undertakes, as in the enormous capacity of modern water filters, on the other from the minuteness of the particles which it attempts to separate, as in the latest developments in colloidal filtration. These are the two ends of the scale as it were, and in between filtration affects almost all the essentials of civilised communities. It is part of almost every manufacture, above all in the manufacture of foodstuffs, it safeguards and purifies drinking water, and air filters have been found essential in the operation of power and electricity generating plant.

The importance of clean air, except in extreme cases, is a point little realised by the average person, but in industrial processes atmospheric conditions are often a vital factor, and the fast moving machine, if not the human being, shows quickly the effects of polluted air. The air filter has been the subject of great improvements in recent years. Machines have a prodigious throughput, a greatly improved efficiency in dirt

trapping and, above all, in ease of maintenance and cleaning.

The old slow sand filter, with its manifest shortcomings, has given way to methods over fifty times as rapid and many times as thorough. Methods of agitating the bed have been evolved to eliminate dead spots, and chemical means are to hand to trap or render innocuous the most elusive of impurities. The treatment of sewage and its conversion into useful fertiliser is another field in which the filtration engineer is constantly recording advances.

In meeting the large scale demands of industry, and more particularly of chemical industry, the widest variety of filtration apparatus has been evolved, from the filter press, which still holds its own, to the many forms of the continuous vacuum rotary filter. Highly efficient plant has been developed to meet the specialised needs of the sugar and oil industries.

On the many and delicate problems that have arisen out of colloidal filtration, Mr. J. A. Pickard writes in an article in this issue. In this sphere the ordinary methods of filtration, except so far as they exist in the use of ultrafilters for small scale work, are of no avail and use is made of the property of adsorption. The filtration of beer and the removal of colloidal water hazes from oil are two questions of major industrial importance which are receiving a great deal of fruitful attention.

A Century of Wood Preserving

QUEEN VICTORIA had reigned but a year when one John Bethell came before her in her chancery to obtain a patent for rendering wood more durable, describing an apparatus in which the timber was impregnated under pressure and giving a list of substances he claimed to use. It was 31 years later when S. B. Boulton obtained his patent for improving the treatment with creosote by heating the timber with the tar at a temperature higher than that of boiling water, whilst in 1884 he read what has become an historic paper on the Antiseptic Treatment of Timber before the Institution of Civil Engineers. This paper, the discussion following it, the above patents, together with a summary both historical and scientific of subsequent developments in the industry up to the present date by H. Fergusson, are put together in a book with appropriate editorial comments by Sir Harold Boulton, the first President of the newly-founded British Wood Preserving Association (P. Allen & Co., 8s. 6d.)

The book is both a record of technical history and an act of filial piety. Sir Harold has spent fifty years in building up the edifice created by his father—those who travel on railways in safety or use the telegraph or telephone, particularly on the American Continent, owe a debt of gratitude to Bethell and to both Boultons for making certain that themselves and their messages arrive at their destinations so far as the soundness of the sleepers and poles is concerned.

We all know that old oak properly immersed or taken care of should be imperishable: thus, at his lecture, Mr. Boulton showed sound specimens from a bridge at Mainz erected by Charlemagne, from a bridge at Rochester built about 1180 and destroyed by Simon de Montfort and from the second bridge there built across the Medway in 1280. But all woods are not

as oak and they are subjected in usage to very drastic conditions, particularly at the earth-air level. So a technique has grown up of treating them usually with creosote, which is wholly successful if properly done and almost as successful when performed in the cheapest possible manner to meet modern economic conditions. The three Messrs. B. and their associates may claim to possess the occult power of tree speech judging from the facility with which they have found out how to introduce creosote into the innermost privacy of a railway sleeper or a telephone pole; the vagaries and humours of softwood and hardwood, of pine or of Douglas fir, have been studied, and the embalming dose of creosote safely administered by means fair or foul.

In North America to-day where there are railways there are timber treating plants, all very similar to those of Mr. Boulton, and waste of timber has been largely reduced; some day the public will understand the world over that all fencing material should be creosoted, for even the world's supplies of timber are not inexhaustible. Meantime the new wood preserving association has been inaugurated with Sir Harold as its first President and his book as its first saga. May it prosper and follow the trail he has creosoted through the forest of ignorance.

Books Received

- ECONOMIC CONDITIONS IN SYRIA, July 1930. By R. Eldon Ellison. Department of Overseas Trade. London: H.M. Stationery Office. Pp. 30. 1s.
- TEXTBOOK OF INORGANIC CHEMISTRY FOR UNIVERSITY STUDENTS. By Dr. J. R. Partington. London: Macmillan and Co., Ltd. Pp. 1083. 15s.
- REPORT ON THE CONDITIONS AND PROSPECTS OF BRITISH TRADE IN INDIA, 1929-30. By Thomas M. Ainscough. London: H.M. Stationery Office. Pp. 211. 3s. 6d.

The Calendar

Oct.		
27	Society of Chemical Industry (Yorkshire Section and Fuel Section): "The Influence of Furnace Atmosphere upon the Scaling of Steel." W. H. Blackburn and Professor J. W. Cobb. "The Determination of the Reactivity of a Coke to Steam and CO ₂ ." A. Key and Professor J. W. Cobb. 7 p.m.	Hotel Metropole, Leeds.
28	Institute of Metals (Swansea Section): "Impurities in Copper." Dr. W. Rosenhain. 6.15 p.m.	Y.M.C.A., Swansea.
29	Society of Dyers and Colourists (Midlands Section): "Bleaching with Hydrogen Peroxide." J. Weber. 7.30 p.m.	Leicester Technical College.
30	British Association of Chemists (Notts and Derby Section): Supper and Whist Drive. 8 p.m.	King's Café, Derby.
30	Biochemical Society of Birmingham University: "The Chemistry of the Constituents of Hops." Professor F. L. Pyman.	University, Birmingham.
30	Chemical Society. 8 p.m.	Burlington House, Piccadilly, London.
31	Chemical Industry Club: Annual General Meeting. 8 p.m.	2, Whitehall Court, London.
31	Institute of Chemistry (Birmingham and Midlands Section): Discussion on Co-operation, opened by R. B. Pilcher.	Grand Hotel, Birmingham.
31	Institution of Chemical Engineers: "The Chemistry of High Pressure Reactions." Professor W. A. Bone. 6.30 p.m.	Institution of Civil Engineers, Great George St., London.

Death of Lord Brotherton

Many Services to Chemical Industry and Education

We deeply regret to announce the death of Lord Brotherton, one of the greatest figures in British Chemical industry and a notable benefactor of education, who passed away at his seat, Kirkham Abbey, near Malton, Yorkshire, on Wednesday evening, at the age of 74. He was taken ill about six weeks ago, and since an operation on Thursday last week had been growing gradually weaker.

LORD BROTHERTON'S death brings to a close a many-sided life. From small beginnings he had built up one of the most successful chemical industries in the country, he had a magnificent record of public service, both in civic life in Yorkshire and in the wider sphere of national affairs, he was a great lover of art and literature, and he crowned his life by a series of public gifts on a truly generous scale.

Although adopted by Yorkshire, Edward Allen Brotherton was a Lancashire man, and was born at Ardwick in 1856, the eldest son of Theophilus Brotherton, a Manchester cotton manufacturer. He was educated at Owens College, Manchester, where he studied under Sir Henry Roscoe, and after leaving there entered the service of a Lancashire chemical concern. Desiring, however, to start business on his own account he founded, at the age of 22, the firm which later became Brotherton and Co., Ltd.

At that time ammoniacal liquor was being produced at all gas works in the country in rather a perfunctory manner. With the assistance of his friends, the Dysons of Middlesbrough, he established his first works at Wakefield in 1878, where the manufacture of ammonia sulphate proved the starting point of his industrial career. The introduction of the ammonia soda process by the firm of Brunner Mond, at Northwich, created a demand for ammonia in the form of a concentrated liquor 15 to 18 per cent., and of this opportunity he also availed himself. Then there was a demand from the wool washers for an ammonia which would replace other alkalis, but it was essential that the product should be free from sulphides and from tarry matters. Lord Brotherton applied himself to the problem of producing pure ammonia direct from gas liquor, without the intervention of ammonia sulphate. He succeeded, and a pure solution of ammonia in water manufactured directly from the gas liquor became one of his company's standard products.

Extension of Early Enterprise.

Owing to the success of the centralisation of supplies of ammoniacal liquor at Wakefield, he decided to extend this enterprise by the establishment of factories in Leeds, Birmingham, Glasgow, and other places. At this time, too, there came a notable opportunity which contributed more than any other factor to the extension of his business. In 1893 an arrangement was made with the late Sir George Beilby by which the Cassel Gold Extracting Co. acquired the rights to a process, which Sir George had worked out and patented, for utilising ammonia as the source of the nitrogen in cyanide by the interaction of ammonia, charcoal and carbonate of potash. The product so obtained contained over 96 per cent. KCN. At the annual meeting of the Society in Edinburgh in 1894, a conversation between himself and the late Sir George Beilby became the starting-point of his technical association with the Cassel Co. The records of his firm showed that they commenced to supply the Cassel Co. with ammonia in 1894, and 14 years later, 1909, the contract quantity had reached 10,000 tons of 25 per cent. liquor ammonia per annum. The Cassel Co. was eventually absorbed by I.C.I.,

At the outbreak of war Lord Brotherton threw himself wholeheartedly into the preparation of munitions. The manufacture of concentrated ammonia liquor was practically doubled by the erection of distillation plant on the premises of several of the largest gas works, and there were also erected, and successfully operated, an oleum factory at Birmingham, a T.N.T. factory at Liverpool, and picric acid factories at Leeds and Wakefield. Immense quantities of explosives were produced at these points.

Purchase of Mersey Chemical Works.

In 1917 he purchased from the Board of Trade for £135,000 the Mersey Chemical Works, Bromborough, Cheshire, which had been founded by a combine of the Badische, Bayer and Berlin Aniline companies for the manufacture of dyestuffs and hydrosulphites. It was a characteristically bold venture, and it achieved the success it merited. When purchased, the factory was producing a range of 12 colours, but this figure has now been multiplied many times, and the output of hydrosulphites has also vastly increased. By this acquisition Lord Brotherton realised his ambition to complete the range of manufactures of his company from coal tar to dyestuffs in his own factories.

In recognition of his outstanding services to chemical industry, Lord Brotherton was presented with the Messel Medal of the Society of Chemical Industry at its annual meeting last July. In presenting the medal, Dr. Levinstein stated that it was bestowed on Lord Brotherton chiefly because, from small beginnings, by enterprise, by courage, by great industry and by the force of his personality, he had built up one of the most successful chemical industries in the country. The medal, he added, was the highest honour the Society could give, and among all the honours that had been bestowed upon Lord Brotherton, they felt it would not be less welcome because it came from those who were connected with the chemical industry and knew Lord Brotherton's virtues.

Besides his activities with the firm that bears his name, Lord Brotherton was a director of several companies. He was vice-president of the American Creosoting Co. and of American Tar Products Co., chairman of British Aniline Co., Ltd., Shettleston Oil and Chemical Co., Ltd., and Wear Fuel Works Co., Ltd.

The jubilee of the firm of Brotherton and Co. was celebrated towards the end of 1928. Lord Brotherton on that occasion visited the works and chatted with the workpeople, and every employee was given a sovereign for each year of service.

Up to 1918 he remained Mr. Brotherton. A baronetcy was conferred upon him in that year, and he was advanced to the peerage in June, 1929, when he took the title of Baron Brotherton of Wakefield. He had been a widower for many years, his wife, Miss Mary Brookes, of Manchester, whom he married in 1883, having died in childbirth during the first year of their marriage. There is no heir to the title.

Lord Brotherton took a substantial part in the civic life of Wakefield, where he was made an alderman in 1901 and mayor in the following year, and in 1928, the year that marked the



THE LATE LORD BROTHERTON

jubilee of the founding of the business, the honorary freedom of the city was conferred upon him.

During his year of office as Mayor a vacancy occurred in the Parliamentary representation of the city, and he was selected as the Conservative candidate. The Liberals did not bring forward a nominee, but a contest was involved owing to the appearance on the scene of Mr. Philip Snowden, who, however, fighting as a Socialist, was beaten by a majority of close upon a thousand votes.

Lord Brotherton stood successfully for Parliament on three other occasions, in 1906, 1910 and again in 1918, when he secured a substantial victory as a Coalitionist. He was once defeated, in the second election of 1910.

In 1913 Lord Brotherton was invited to become Lord Mayor of Leeds, and most of the public institutions of the city benefited largely from his tenure of the office. But the dominating event of his year of office was the outbreak of the war. Entirely at his own expense, he raised and equipped the 15th Battalion of the West Yorkshire Regiment, and was appointed its Honorary Colonel. He subscribed £5,000 to the Prince of Wales's National Relief Fund, and very freely supported the Red Cross organisations, and he subscribed half a million pounds to the War Loan Fund, and gave to the National Exchequer the whole of the interest on the money.

Many Public Gifts

After the war he devoted himself to alleviating distress caused by the war, did much to assist ex-officers and men, and gave generously to hospitals. Following the Leeds Tercentenary celebrations in 1926, he was included in a list of seven citizens upon whom the freedom of the city was conferred. He was a Deputy-Lieutenant for the West Riding and a magistrate for the West Riding and the Liberty of Ripon.

Among Lord Brotherton's many gifts that by which he will chiefly be remembered will be his gift of £100,000 in 1927 to provide library buildings for Leeds University. A year previously he had given £20,000 for the foundation of a Chair of Bacteriology, and not so long ago he announced his intention of handing over his own splendid library to the University. He had a passion for book-collecting, and he possessed a wonderful collection, the catalogue of which extended to more than 30 quarto volumes. It included rare first folios of Shakespeare's works, fine mediæval illuminated manuscripts of the early English, Dutch, French and Flemish schools, whilst the eighteenth and nineteenth centuries were represented by books covering the whole range of English authorship.

The foundation-stone of the new library was laid on June 24 last, and Lord Brotherton added a gift of £30,000 for maintenance and administration. In November, 1929, he gave £25,000 to the Prince of Wales's Fund for Toc H to endow it in Yorkshire, and undertook to provide a house in Leeds to be the Yorkshire headquarters.

Tributes from Lord Melchett and University

The following tribute was paid by Lord Melchett on Wednesday: "I have heard with the greatest regret of the death of my old friend and colleague, Lord Brotherton. Lord Brotherton had built up by business acumen and energy a very considerable and important business in connection with ammonia, tar, and other branches of chemical industry. I knew him for years in the House of Commons as a zealous member and always a bright and cheery friend. His liberality to public and private benefactions is well known. He belonged to a generation which, unfortunately, is passing away, and which it will be difficult to replace."

In the course of a resolution of sympathy, the Council of Leeds University recalls Lord Brotherton's interest in its welfare and adds: "His endowment of the Chair of Bacteriology raised the Medical School of the University to a new level of efficiency. His gift of a Library building has secured for the University for all time a pre-eminent place among the Universities of the world. His undivided loyalty towards the University of Leeds has been a source of deep gratification to the Council, and will be remembered with pride in the days to come. Rarely has a University had so princely a benefactor of learning: never has a University possessed a more faithful friend. His name gives honour to our roll of honorary graduates, and his public life and work have enhanced the fame of the University."

Fuel Research Papers

Gas Flow Measurement and Composition of Light Oils

Two further Fuel Research reports have just been issued by the Department of Scientific and Industrial Research under the titles of "The Measurement of a Rapidly Fluctuating Flow of Gas" (Technical Paper No. 27, price 6d. net) and "The Determination of Aromatic, Unsaturated and Naphthalene Hydrocarbons in Light Oils and Motor Spirits" (Technical Paper No. 28, price 4d. net).

Paper No. 27, by J. G. King, Ph.D., F.I.C., and B. H. Williams, Ph.D., B.Sc., describes an apparatus with which it is possible not only to measure and record the total volume of the gas made during normal water-gas practice, but also to determine the amount of gas made in each cycle or part thereof. The method is quite a simple one, involving the photographing of the meniscus of a moving liquid in an inclined gauge. It is recommended, in conjunction with an orifice plate, as a valuable method of recording variable gas flow in industrial processes. Orifice-plate and Pitot-tube methods have been applied to exact measurements of the air supplied during the blow period of the water-gas process. The orifice plate method, although not necessarily more accurate, is shown to be the more practicable under such conditions. The methods have been evolved in connection with extended research on the water-gas process at the Fuel Research Station, and will be employed throughout future investigations.

Paper No. 28, which is by A. B. Manning, Ph.D., M.Sc., D.I.C., and F. M. E. Shepherd, M.Sc., arises out of the problem of determining the composition of the light oils obtained from the carbonisation of coal at different temperatures. The study of these light oils, which have a boiling range from approximately 30° to 170° C, throws some light on the reactions occurring during carbonisation, and is of importance also as affecting the utilisation of the refined oils as motor spirits. In analysing light hydrocarbon oils of this character, it is sufficient for most purposes to determine the relative proportions of unsaturated, aromatic, naphthene and paraffin hydrocarbons. If a method for such a determination is once established, a more complete knowledge of the composition of the oil is readily attained by applying the method to suitably chosen fractions of the original oil.

The present paper gives a method for determining the unsaturated and aromatic hydrocarbons and the naphthenes of the cyclohexane series, in volatile hydrocarbon oil mixtures. The method involves the separation and weighing of definite derivatives of the aromatic and naphthene hydrocarbons and is therefore a chemical method. Physical methods are scarcely applicable to the examination of such complex mixtures, even if the necessary data relative to the individual hydrocarbons were available.

Institute of Chemistry

Results of September Examinations

THE following passes in the September examinations of the Institute of Chemistry have just been announced:

Examination in General Chemistry for the Associateship: Erasmus Thomas Buggé, B.Sc. (Lond.), (Birkbeck College, London), Alfred Walter Doyle, A.M.C.T. (College of Technology, Manchester), Albert Henry Fuller (Technical College, Leeds), George Richard Gilson (Municipal Technical College, Hull), Thomas Hayes (Technical College, Leeds), David Arnold Hudson (Technical College, Leeds), Walter Edward Huggett (Municipal College, West Ham), George Harold Jeffery, B.Sc. (Lond.), (University College, Southampton), John Walker Spence (Chelsea Polytechnic, London).

Examination for the Fellowship: In Branch E: The Chemistry, including Microscopy, of Food and Drugs, and of Water: Cecil Abell Bassett, B.Sc. (Birm.), Donald Frank Harrington Button A.R.C.S., James Frederick Clark, M.Sc. (Lond.), A.R.C.S., Ernest Stephen Hawkins, B.Sc. (Lond.), A.R.C.S., Albert Houlbrooke, M.Sc. (Liv.), Reginald Arthur McNicol, M.Sc. (Lond.), Charles Percy Money, B.Sc. (Lond.), Francis Edwin Needs, John Edwin Ritchie, M.A., B.Sc. (Aberd.), Ronald Henry Maxwell Savage, William Arthur Waygood, B.Sc. (Lond.), A.R.C.S. In Branch G: Industrial Chemistry: Lionel Hewgill Smith.

Lines of Development in the Use of Fuel

Sir David Milne-Watson's Presidential Address

The importance of further scientific development in the methods of using coal in Britain and of co-ordinating the activities of the carbonising industries with proper linkage to electricity development was stressed in Sir David Milne-Watson's presidential address at the annual conference of the Institute of Fuel, held at the Incorporated Accountants' Hall, London, on Wednesday.

THE Institute of Fuel continued to expand, said Sir David, and the membership had increased 35 per cent. in the past year. Two provincial sections had been established with meeting places at Manchester, Nottingham, Derby and Bristol. The number of students was now 90 and a Students' Section was to be formed.

Lord Melchett had recently added to the long list of services he had rendered to the Institute by endowing a Medal for the recognition of original work in connection with the use of fuel. The first recipient of the Medal would be Dr. Kurt Rummel, Director of the world renowned Warmestelle of Düsseldorf. It had been hoped to make the presentation at that meeting, but this could not be arranged. Dr. Rummel had been engaged on fuel economy research and co-ordination work in the German Iron and Steel Industry for several years past. The results of his direction were shown in a 15 per cent. reduction in the fuel used per ton of finished product in that industry.

Of the British contributions to the World Power Conference at Berlin, one-third of the papers were presented by members of the Institute of Fuel. The Conference discussed many matters which were of the greatest benefit, not only to industry but to civilisation. The display of German engineering and chemical developments was illuminating in showing how Germany is endeavouring to reduce costs of production and extend her markets by the intensive and ordered application of science to industry.

Growth of the Use of Gas

The great extension of the use of gas all over the world was especially commented upon at the Berlin Conference. Consideration was also given to the setting up of gas networks. In England, the Area Gas Supply Committee made their report recently. Whilst unable to generalise, they recommended one scheme and steps are now being taken to translate the proposal into action. This committee recognised the need of the gas industry for modern legislation, and it was hoped that the Government would be able to pass new legislation this coming Session. The Committee also commented upon the increasing demand for gas for industrial uses. It appeared to be well known that by reason of the increasing mechanisation of industry and the greater use of power the sales of electricity were advancing rapidly. It was not so generally appreciated that there was a concurrent desire for efficient means of heating. This had resulted in the sale of gas increasing at nearly twice the quantity of the electricity increase when referred to a common heating basis.

In spite of the steady growth in the use of gas, the coal consumption of the gas industry had remained at 18 million tons per annum for several years on account of the use of more efficient plant. As the plant was becoming highly efficient throughout the country, further increases in the gas production per ton of coal could only be small and a demand for coal increasing with the demand for gas was to be expected in the future.

Consumption of Coke

The Area Gas Supply Committee gave much attention to the production of coke and found that, when properly prepared, there was a wide domestic market waiting, which included the use of coke in open grates. They also found that the adoption of modern coking plant would result in savings of great importance to the competitive power of the iron and steel industry. Coke for domestic and industrial use showed an increased demand of 400,000 tons last year. This was attributed to the care now taken in sizing and cleaning. Further work was in progress to improve coke quality by preparation of the coal before carbonising. In three years the Gas Light and Coke Company had spent £400,000 on coke preparation plants.

Future of Smokeless Fuel

Several low temperature processes were being operated in various parts of the country, including some by the Gas Light and Coke Company. The successful treatment of coal by

low temperatures was now understood. On the financial side plants which could secure good slack at low prices and sell the coke at good prices could show a profit. Other plants at a distance from the coalfields could not find sufficient margin to meet operating expenses. There was a market for low temperature gas and coke, but the oils had proved disappointing in quality and value as also had ammonia.

The perfecting of cracking or hydrogenation processes to improve these oils was awaited. Until this could be achieved successfully on a commercial basis and the consumer of smokeless fuel had to pay no more than his air polluting neighbour, there was no hopeful future for any low temperature process principally devised to make smokeless fuel. It was more probable that the smokeless fuel of the future would be prepared from selected, prepared, and blended coals by high temperature processes.

Home Produced Oils

The proper organisation of the carbonising industries could produce 12 per cent. of the motor spirit and 25 per cent. of other imported oils. It was necessary that the production of such oils should be modified and controlled to produce the required properties. In the past too much attention had been given to oils resulting from carbonisation without reference to their having the desired properties. It is a matter for congratulation that the Admiralty were making trials of home-produced oils, and other large users should follow suit.

The experiment of carbonising coal before combustion at a power station was being continued. Several important power stations now mixed coke breeze with their coal. Large quantities of coke breeze were so used in London. The salesman of to-day serving the gas industry had already to differentiate between gas, coke and other forms of smokeless fuel, and it was not difficult to visualise an extension of his activities to electricity. This meant that, in future, gas and electricity would tend to co-operate in the marketing of their wares, so as to give greater satisfaction to the consumer and to avoid business being secured at unremunerative prices. The proper uses of the various forms of prepared energy were generally so clearly defined that such co-operation presented no difficulty.

Reference was made to developments in hydro-electric power generation in Ireland and Scotland and to the Severn tidal proposals, but it was pointed out that coal must remain the principal means for the generation of electricity in this country.

Coal the Nation's Cure for Depression

There was no oil, brown coal, or natural gas in this country. Ours was then a coal country. Our coal was of high quality. For a century past coal had been the foundation of our prosperity. To-day, as in the past, our success as a manufacturing nation must be based on coal. In 1929 the coal output was 20 million tons greater than 1928, and the industry had shown evidence of improvement in the past two years. Progress had been made in the mechanisation of mines, improved mining methods, and the industry was approaching a favourable, if not prosperous, state.

In the midst of this state of affairs, the Government had introduced and passed the Coal Bill for reasons of political expediency. It contained potentialities objectionable to the industry itself, and to all fuel users, particularly gas, electricity and railways whose reactions were predetermined by Statute. Economic laws might prove superior to Acts of Parliament and people might be driven to the use of oil and to reduce the consumption of coal. Coal should be subjected to treatment before marketing, to ensure maximum value and satisfaction to the user. Care in this direction had already enabled us to secure again foreign markets lost in competition with Polish coal.

A proper fuel policy would aim at a higher standard of freedom from ash in coal than was at present recognised. The removal of ash was daily becoming of greater importance, so as to avoid waste in costs of transport, maintenance of furnaces,

clinker removal, ash disposal, and to prevent dust from chimneys. Three million tons of ash were needlessly transported and handled several times annually in this country.

Cleaning, grading and selection of coal varieties opened the door to the sale of coal by guaranteed specification. This form of purchase was growing. The transport of energy in coal whether as coal, gas or electricity needs examination to secure it at a minimum cost.

A considered plan for the purpose of co-ordinating and extending the activities of the carbonising industries with proper linkage to electricity development was necessary. This plan would also take into account the production of hydrogen for chemical industries and the home manufacture

of oils and motor spirit. Extension of the smoke laws to domestic users would improve the health of the community and save needless expense in making good damage and dirt from uncontrolled coal combustion. A proper fuel policy would see to the education of consumers in regard to the right use of fuel.

Progress on the lines indicated would show a need for more fuel technologists, as only those versed in the best methods to extracting the energy in our greatest national asset—coal—would be competent to devise and secure the necessary co-ordination. The Institute of Fuel was well qualified to undertake the co-ordination work and to disseminate the necessary propaganda.

Memorial to Professor W. H. Perkin

Life and Achievement of a Great Chemist

At the meeting of the Chemical Society at Burlington House, London, on Thursday, October 16, the bronze plaque of the late Prof. W. H. Perkin was unveiled. Prof. J. F. Thorpe, F.R.S. (President), was in the chair and there was a crowded attendance.

PROFESSOR ROBINSON said the origin of the Memorial was that the late Professor W. H. Perkin should have been presented with his portrait on his 70th birthday, but before that could be put into effect everybody had been shocked by his untimely death. Therefore what had been intended as a compliment on the part of colleagues, students and collaborators had unfortunately been transformed into a memorial. It was decided that a bronze plaque of the late Professor Perkin should be made. Indeed, three plaques had been prepared, one of which was to be placed in the rooms of the Chemical Society, another had already been placed in the University of Manchester, and the third would be unveiled at Oxford in a few days. The connection of Perkin with the Chemical Society was a very close one, continued Professor Robinson. He was elected a Fellow in 1884, he served three terms as Vice-President and was President from 1913 to 1915.

After the plaque had been unveiled by Mr. A. J. Greenaway, Professor Robinson, on behalf of the subscribers to the Perkin Memorial Fund, asked the President of the Chemical Society to accept the plaque as a memorial to their old Professor.

The President, in accepting the plaque, expressed the thanks of the Society to the members of the Memorial Fund Committee and the subscribers, and promised that it would be placed in a prominent position in the rooms of the Society and treasured as a memorial to one of their most distinguished Fellows. The plaque would probably only have a temporary home in the present premises, but he could give the assurance that when their new building was ready the plaque would be placed in a prominent position among a number of other memorials to their distinguished dead. As a Society they seemed to be singularly lacking in such memorials, and in the hope that others would be borne in mind when they moved to their new premises he recalled that it was remarkable that there should be no memorial of the late Sir William Ramsay.

Professor W. N. Howarth's Tribute

Professor W. N. Howarth, F.R.S., in an appreciation of the life and work of the late Professor W. H. Perkin, said that generations of his students had united in this memorial to show gratitude and reverence to a consummate master and to express a devotion which lapse of time did not impair. All who knew him as a professor in the class room experienced his unique power as a teacher, while those who were privileged to be his research pupils were conscious of being laid under a debt which could never be repaid.

Perkin's span of life was co-extensive with the rise and development of modern structural chemistry. Born in 1860, he was a boy at school when Kekulé propounded his benzene formula. The quadrivalency of carbon had been enunciated only two years before. Hofmann was still Professor at the Royal College in Oxford Street and Perkin senior had achieved early success in establishing the industry of synthetic dyestuffs. To the son of such a father there never seemed to be any doubt as to his choice of a vocation.

Having outshone all his contemporaries among the chemistry students at South Kensington, Perkin was sent to Germany to study under Wislicenus, and under his guidance soon won recognition at Würzburg. Perkin graduated at Würzburg in

1882, and proceeding from there to Munich he found, during his four years' association with Adolf Baeyer, his real spiritual home. After a short time he won Baeyer's warm approbation and became research assistant. It was here that Perkin began that series of researches which he continued with such zeal and success on the synthesis of closed carbon chains. Perkin had sketched the history of this early development of chemistry in his Pedlar lecture; he returned to the subject again and again, and did not finally leave it until he had synthesised every naturally occurring monocyclic terpene and investigated the constitution of camphor and its analogues. It was in recognition of this work that he had received, at an earlier age than usual, the Davy Medal of the Royal Society.

A Man of Many Interests

After recounting how, in spite of his strenuous work in the laboratory at Würzburg, Perkin found time for visiting the theatre or the ball-room, and of his ability as a violin and piano player, Professor Howarth spoke of Perkin's return to this country from Munich in 1886 and of his short period of work by the invitation of Professor H. B. Dixon, in Manchester, where the investigation of the natural colouring matters, brazalin and hæmatoxylin, was begun. Shortly afterwards, Perkin was called to his first Chair at the Heriot Watt College, Edinburgh, which he held for six years, during which time he commenced the series of researches on the alkaloids berberine and cryptopine, the constitution of which, together with other alkaloids, was finally established many years later, and by their synthesis, in collaboration with Professor Robinson.

It was on the death of Schorlemmer that Perkin was invited to the Chair of Organic Chemistry in Owens College, Manchester, in 1892, where he built up a great school of research and entered upon the exceedingly productive period which he had once spoken of as his "golden age" of research. Fischer once declared that it rivalled his own school in Berlin. The large Schorlemmer laboratory and the Perkin private laboratory, together with the splendid building which had been the working home of Dr. Edward Schunck, satisfied the needs of a large staff of research workers for many years, until the Morley laboratories were added.

There was little doubt that Perkin found his work at Manchester very congenial. On four mornings a week he lectured at 9.30, and on two of these he arrived at 8.30 or a quarter to nine to superintend his assistant's arrangement of the lecture table. It was also common knowledge that before he appeared at the laboratory he had occupied himself from 6 a.m. with practice at the piano or in the cultivation of his garden. He took his lectures very seriously and spent much nervous energy in his preparation for the delivery of them. He spoke in clear tones with an easy flow of words, and the arrangement of his formulæ and other details on the blackboard were ideally perfect. The rest of Perkin's day was devoted to research students and to experimental work at his bench until 3.30 or 4 p.m., with never more than an interval of half an hour for lunch. Within the space of four hours he contrived to get through more work than any of his collaborators could accomplish in twice the time. The evening was available for entertainment, orchestral music in his drawing room with

invited friends or musicians from the Hallé or, in the case of most evenings, to the composition and writing of his original papers, which he always typed himself.

To see Perkin at work, said Professor Howarth, was a mental stimulus and inspiration. His skill in manipulation, combined with his judgment and observation, filled one with wonder. From his long and varied experience he had acquired an insight into chemical behaviour which was well-nigh uncanny, and his quick judgment on the nature of his products was equally remarkable. An envious but irreverent pupil once said that Perkin could induce any substance to crystallise for the reason that out of the vast number and variety of crystalline products he had handled of every geometrical form, he always secreted a suitable nucleus in his beard!

Passion for Research

Perkin's close and intimate interest in the work of his pupils and the help and encouragement he gave them, resulted in an *esprit de corps* and a personal loyalty to himself which were the greatest incentive to good work and to the progress of research. In an atmosphere which was charged with Perkin's keenness and zeal, scientific investigation could not do otherwise than flourish, and the school grew round the man, bringing with it success and wide recognition. With Perkin, research was a ruling passion which he communicated to everyone who worked with him, and it was sufficient to say that many of his pupils found their sustaining force in Perkin's example when placed in other environments. Some would recall the different atmosphere they encountered when they moved on, and discovered that in some quarters original research was considered of little account and even a hindrance to the fulfilment of one's teaching duties. If that feeling no longer existed in our universities in this country, and if the participation in the extension of the boundaries of knowledge had become recognised and had taken its place among the chief duties of a University teacher, then that reform was due, in considerable measure, to the persistence with which it was advocated by Perkin and a few others who were his contemporaries. Perkin rendered a service in making known the value of research at a critical time in the history of chemistry in Britain and founded a school which, like that of Meldola, Armstrong and a few others, won a place of honour for organic chemistry in this country.

Of Perkin's later life and work at Oxford from 1912 to 1929, Professor Robinson would doubtless speak in the course of the next few days when a similar memorial was to be unveiled in the laboratories there. Suffice it for him to say on the present occasion that the great work Perkin did for Oxford was appreciated by no one more than Oxford itself.

In the too early death of Perkin, concluded Professor Howarth, chemistry had lost one of its most powerful exponents of the science that this country had known. They would miss his impressive, kind personality, and also the continuance of the brilliant experimental papers which, over a period of 50 years, he contributed to the *Journal*. But in our appreciation of his life and his achievements the feeling which would remain dominant in our minds was one of gratitude for a great leader, who consecrated his ability and intellect to the one ideal for which the Chemical Society existed, "that original research is in itself and by itself the most powerful weapon that ever can be wielded by mankind in struggling with the great problems which nature offers on all sides for solution."

A photograph and description of the plaque appeared in last week's issue of THE CHEMICAL AGE.

Chemical Society Meeting

AN ordinary scientific meeting of the Chemical Society will be held at Burlington House, London, on Thursday next, when the following papers will be read: "A General Method for the Preparation of Thiocyanine Dyes. Some Simple Thiocarbocyanines," by N. I. Fisher and F. M. Hamer; "Stereochemical Influences on Aromatic Substitution. Substitution Derivatives of 5-hydroxyhydrindene," by W. H. Mills and I. G. Nixon; and "Syntheses with $\beta\beta'$ dichlorodithylether. Part II. Heterocyclic Compounds Containing Two Different Atoms of the Oxygen Group in the Ring. 1,4-selenoxan," by C. S. Gibson and J. D. A. Johnson.

A Bookman's Column

THE steady demand for the German textbook of F. P. Treadwell on *Analytical Chemistry* is illustrated by the appearance of the seventh English edition of Volume I, which deals with *Qualitative Analysis* (Chapman and Hall, pp. 610, 23s.). Mr. W. T. Hall, of the Massachusetts Institute of Technology, the translator and reviser, explains that in this new edition about forty-five pages of new material have been added and two-thirds as much old material has been removed, so that the total size of the book is only increased by fifteen pages. The greater part of the changes occur in the section devoted to the reactions of the rarer elements. Valuable comments on this part of the book were obtained from an English chemist, H. F. V. Little, who pointed out a number of defects and suggested some tests for rare earths which the translator considered well worth mention. The work is recognised as a standard text book of great authority on the subject, and Volume I appears to have been very thoroughly brought up to date.

The British Science Guild has performed a real service in issuing a new edition, compiled by Daphne Shaw and entirely revised and enlarged, of its *Catalogue of British Scientific and Technical Books* (pp. 754, 20s.). The work has been done under the direction of a representative committee of which Sir Richard Gregory was chairman. The present edition includes 13,915 titles—more than double the number in the original volume. The catalogue is limited to books published by British firms, and in their lists up to September 1929. It may therefore be taken to represent the position at that date of British scientific and technical literature so far as textbooks and works of reference in the fields of science and technology are concerned. Altogether an extremely useful reference book.

A third edition is issued of Horace G. Deming's *General Chemistry*, described as an elementary study emphasising industrial applications or fundamental principles (Chapman and Hall, pp. 715, 17s. 6d.). Issued first in August, 1923, there has been a continuous demand for the book, and successive efforts have been made with each edition to bring its matter up to date. In this new edition, the opening chapters have been further simplified so as to introduce the subject more gradually. The sections dealing with organic chemistry have been re-written to review briefly the applications of organic chemistry in industry. Throughout the book descriptions of industrial processes have been modernised, much new material introduced, and new teaching aids supplied. The exercises and problems, an interesting and helpful feature to the student, have been completely re-written. An attempt has been made to represent chemistry as a growing science, and to maintain what is thought to be a "reasonable attitude" to ideas still in a state of flux.

Modern Sewage Disposal and Hygienics, by S. H. Adams (Spon, Ltd., pp. 473, 25s.), can hardly be better described than it is on the title page as "a treatise on the subject of sewage disposal with details of present day practice outlining the basic laws relating thereto and the requirements of the Ministry of Health regarding works for the purification of sewage." Tables, graphs, and illustrations, with an historical *résumé* showing the evolution of the science and its bearing upon the status of the community, are also given. It contains some interesting gossip history and many early photographs of bits of old London.

The sixth edition, revised and enlarged, just issued by J. B. Lippincott Co. (pp. 342, 15s.) of *Chemistry of Familiar Things*, by Samuel Schmucker Sadtler, testifies to the persistent demand for books that satisfy a general interest in chemistry without requiring too severe a standard of chemical knowledge in the strictly scientific sense. The author meets this demand successfully with a volume which, after dealing with the principles of chemistry generally, proceeds to deal in a popular way with the chemistry of light, heat, air, water, alkalis and salts, metals, soil, foods, and so on. The mastery of this volume will not make the reader a chemist; but its reading will interest him and give him a general idea of the chemistry of the things about him and add to his interest in life.

Fact and Theory in Colloid Filtration

By J. A. Pickard

In the following article Mr. J. A. Pickard, the author of "Filtration and Filters: An Outline of the Art," discusses some of the current problems in the research and practice of filtration with special reference to the filtration of colloids.

THE difficulties which beset the path of technical filtration increase in complexity as well as in number as we proceed from the simple operation of straining, through the filtration of suspensions of discrete particles of steadily decreasing size, up to the borders of true solution; and if these difficulties are thought of as increasing not in inverse ratio to the linear dimensions of the particles to be removed but in direct proportion to the surface possessed by a given weight, this will be a roughly accurate expression of the facts.

Nothing can be simpler than the separation by sieves with suitable meshes of particles too large to get through the holes, and the filtration of most granular precipitates, even when very fine, presents little practical difficulty. Yet even here the separating operation is beginning to be less simple in its mode of action. It is no longer simply because the particles are too large to go through the holes in the medium that they are stopped. It is well known that structures commonly possess throughout their bulk channels amply large enough to permit the passage of particles ten times as large as those which are effectively and completely removed. All that is necessary is to have a sufficient depth of filtering bed, so that in passage through the tortuous channels and narrow spaces which it contains a particle must inevitably encounter some awkward corner in which it will stick before winning its way through. Such a filter is, none the less, mechanical in its method of working and its success depends upon some predisposition of the particles—albeit slight—to settle from suspension.

For the separation of particles of colloidal size such methods are, generally speaking, inadequate, and it is necessary to supplement mechanical filtration with means of a different nature, the most commonly applied method being to take advantage of the phenomena of adsorption. This is not invariably the case, and with ultrafilters it is possible to have a medium possessing pores of such exceedingly minute size as to prevent mechanically the passage through them of the colloidal particles. This is, in effect, a return to the sieve action of the simplest form of filters, but although this type of filtration offers a promising field for development, it is at present of more interest for research or small scale work than for commercial operations. On the commercial scale the chief use hitherto made of it is in the separation of colloidal suspensions of water from oil.

Clarification of Jellies

In the foregoing the modern meaning has been given to the word "colloid" implying a dispersion of particles each of infinitesimal volume and very large surface area per unit weight. In commercial usage colloids are more frequently thought of as Graham thought of them, as glue-like bodies without crystalline properties, such as gelatine, agar agar, or protein, and the filtration of colloids commonly implies the clarification of jellies.

Take, as an instance, one technically highly important case—the production of a bright gelatine. Ultrafilters are no use here. By their means it would be possible to separate the actual gelatine (and, of course, the grosser impurities associated with it) but that would not be to accomplish the object in view. To clarify gelatine it is necessary to remove from it particles which may be of the same order of size as the gelatine aggregates themselves, but which are of a different nature. All forms of mechanical filtration would appear to be unsuitable here, yet it has been known for many years that the desired result can be obtained by employing compressed paper pulp as a filtering medium. The reason

for the successful action of such a filter—when filters of much finer mechanical porosity, such as beds of kieselguhr, are inadequate—lies in the specific attraction of the surface of the fibres of the paper for the impurities mingled with the gelatine, that is, in the particular adsorptive power of the surface.

Cause of Adsorption

What is this adsorptive property which is capable of such useful application? A theory which has attracted considerable attention is that the effect is due to electrical charge existing on the surface of the filtration medium, which is capable of attracting particles with a charge of opposite sign. It is known that in an electrical field pulp behaves as if slightly negatively charged, and gelatine is also similarly charged. Bogue considers that the mucins and albumins, which are the chief impurities removed and which are more strongly negative than gelatine, are attracted to the fibres, which to them are positive on balance. The action of alumina, which is strongly positive, is too severe and results in the adsorption of both gelatine and mucins.

The existence and persistence of electrical charges on particles suspended in water, and even in electrolytes, despite all efforts to earth or discharge them electrically, presents some difficulties in belief, even to the devout. The agnostics scoff openly. If, instead of electrical charges, some obscure magnetic property were postulated the difficulties would be less, and the absence of a precise quantitative action would be explicable. Yet that would be no more than to say that particular surfaces were capable of causing certain specific particles to adhere to them, and there seems no special reason why such a property should be definitely attributed to electrical action.

Recent Research

Whatever the basic cause of this surface action may be, it undoubtedly exists, and during the course of long series of experiments in the laboratories of Metafilters (1929) Ltd., means have been discovered of conferring, by comparatively simple means, almost any type of adsorptive effect upon surfaces previously inert. While it is premature to publish here the results, which form the subject matter of patent applications, it may be interesting to mention that by this method gelatine may be filtered bright by means of kieselguhr more efficiently than by the use of paper pulp, and iron dissolved (as ferrous ammonium sulphate) in water can be quantitatively removed. Incidentally, before leaving this subject, it is interesting to note that in some instances very unexpected results have been observed. For instance, when treating particles which were attracted to the positive pole in a way intended to increase their negative charge (if this exists) the particles became electrically neutral and had no tendency to seek either pole. They were, however, far from inert as regards adsorptive power.

The Problem of Beer

Of other "commercial colloids" which might be mentioned, beer and hazes of oil in water may be touched upon. Beer, when filtered, has up to now been very largely dealt with by means of paper pulp filters. Beer appears to be a very delicately balanced system in which many different colloids mutually maintain each other in solution. Although bright to a casual glance a sample of beer may appear hazy or full of suspended particles when examined by a bright transverse light against a dark background. If purified till it appears brilliant under this test (apart from the ever-present Tyndall cone), a more searching test will still show

up particles capable of scattering light; in fact no sharp line can be drawn between brilliant and hazy beer. To obtain beer which not only is brilliant but will remain so depends upon the removal of the colloidal particles to a definite degree, but not so far as to upset the equilibrium of the remaining colloids with resultant precipitation. In some instances filtering processes designed to produce beer which will remain bright, on the theory that if all bacteria and yeast are removed this must necessarily follow, have defeated their own end by disturbing this equilibrium, with the result that further deposits are formed. The ideal medium, while removing bacteria, etc. (which may themselves be regarded as colloids), leaves untouched the colouring, protein and oily colloids.

Water Hazes in Oil

The removal of colloidal water hazes from oil is a matter of considerable commercial importance both with mineral

and with animal and vegetable oils. From vegetable oils the removal by means of ultrafilters has already been mentioned, although this is not the only way adopted. The removal from mineral oils, in particular from turbine lubricating oils and transformer oils, is a problem which is being successfully solved by filtration processes employing the property of adsorption. It is a striking fact, showing well the powerful nature of this effect, that in cases where it has proved impossible practically to remove water hazes by such means as stirring with strong dehydrating chemicals, such as quicklime, complete success has been easily achieved by filtering through beds of suitably adjusted adsorptive material. In a forthcoming article it is hoped to give particulars of the plant used and results being obtained, but it is only possible to say here that for simplicity and cheapness colloidal filtration appears to be by far the most advantageous method.

Filter Manufacturers and their Products

Review of Modern Plant Developments

In the following pages will be found notes on the products of leading manufacturers of filtration plant and the principles which guide their development. Some firms have for very many years devoted themselves to the solution of certain major filtration problems and the efficiency, capacity and speed of modern plant is a tribute to their labours and research.

British Suchar Processes, Ltd.

The successful filtration of sugar liquors presents numerous problems which are principally concerned with the building up of a uniform filter cake, which can be effectively sweetened-off. Other important considerations are the necessity for ensuring a long life for the filter cloths, and also obtaining the maximum amount of useful filtering time and reducing to a minimum the time consumed in cutting down, cleaning, redressing, opening and closing the filter. The well-known plate and frame press, while simple in construction and easily operated, does not generally give a uniform cake except when handling a very freely filtering juice. Too often the upper part of the cloths only contain a smear, and successful washing cannot be effected. Again, a large proportion of time is taken cutting down and cleaning the filter press, an exceedingly dirty operation.

The patented Auto Filter of British Suchar Processes, Ltd., 16, Abbey House, 2, Victoria Street, London, has been designed for the rapid economical separation of relatively small amounts

of suspended solids from liquids. The leaves or filtering elements are carried on a rotating frame and the cake formed is of an even thickness, thus permitting thorough and efficient cake washing. The filtrate from each leaf passes through a separate pipe, and should any individual leaf run cloudy for any reason it may be shut off without interfering in any way with the operation of the filter as a whole.

In sulphitation the filter can be employed on clarified juice and syrup (especially Bach sulphitation syrup), and in carbonation on first or second carbonated juices; and also on syrup.

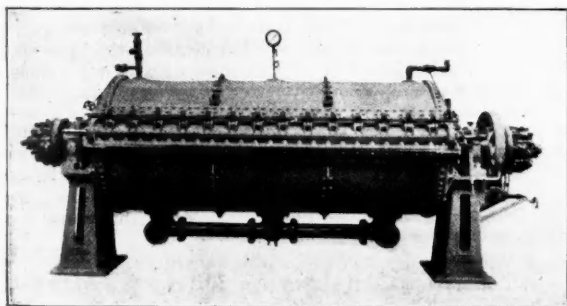
In refineries the Auto Filter is especially suitable both for the prefiltration of sugar melts containing kieselguhr, calcium carbonate or calcium sulphate, and also for the filtration of liquors containing decolorising carbons which are being employed in increasing quantities in the refining industry.

The Visco Engineering Co.

The amount of dust suspended in the ordinary atmosphere is rather startling when expressed in figures, although the well-known example of a ray of sunlight entering a shady room is sufficient proof that the air we breathe is heavily laden with solid matter. Atmospheric dust, as it may be termed, consists of soot, ashes, soil, sand, hair and fibres of all kinds. In country districts the amount of dust suspended in the air is comparatively small, and does not as a rule exceed two milligrammes per cubic metre. In towns the proportion is considerably larger, being between 2 and 10 mgs. per cub. m., while in industrial districts it is often as high as 25 to 50 mgs. per cub. m. Objectionable as dirty air is, so far as its effect on the decoration and furnishings of the building is concerned, it is harmful to the lungs of the occupants when supplied in such a concentrated form. Still more serious is the fact that most disease germs are air-borne, and they especially abound in dusty air. The air filters in common use comprise:—

(1) Dry cloth screen filters, including cotton wool screens which are very efficient dust-catchers, and are comparatively cheap to instal, although great care must be taken to ensure air-tight joints between the screens and the sides of the air channel. These were popular at one time, but are now almost obsolete, chiefly due to the certain drawbacks which have to be overcome in the large space occupied, rapid building up of resistance as the cloths get dirty, high maintenance costs owing to frequent cleaning and removal of cloths, and the fire risk.

(2) Air washers of the flooding and spray chamber type are usually designed on the basis of an air speed of 400 to 500 ft. min., and occupy less space than the old dry cloth filter. They are fairly efficient for removing solid matter from the air, and act as de-odorisers to some extent, imparting also a certain humidity to the air. There are certain dusts, however, which have no affinity to water, such as fine carbon which, in the form of soot, is present in large quantities in town air, and to this extent the air washer will not thoroughly cleanse the air and prevent the blackening of walls and ceilings already referred to. The efficiency of this type of air filter when dealing with sooty air is only about 70 per cent.



A 900 SQ. FT. AUTO FILTER FOR FILTRATION OF SUGAR LIQUORS.

of suspended solids from liquids. The leaves or filtering elements are carried on a rotating frame and the cake formed is of an even thickness, thus permitting thorough and efficient cake washing. The filtrate from each leaf passes through a separate pipe, and should any individual leaf run cloudy for any reason it may be shut off without interfering in any way with the operation of the filter as a whole.

The Auto Filter is especially adapted for the filtration of sugar juice and melts containing decolorising carbons, kieselguhrs, carbonate of lime, or other suspended matter. It can be used with advantage in cane or beet factories making plantation white sugar by the sulphitation or carbonation process.

for the reason just mentioned, although it is probably as high as 95 per cent. with certain other kinds of impurities. With this apparatus, it is possible to cool the air to some extent, generally to within 2 or 3 degrees of the wet bulb temperature, but this cooling also results in increasing the humidity to very nearly saturation point, which is not always desirable. A very useful application of the spray washer is when it can be used in conjunction with a refrigerating plant for cooling the spray water.

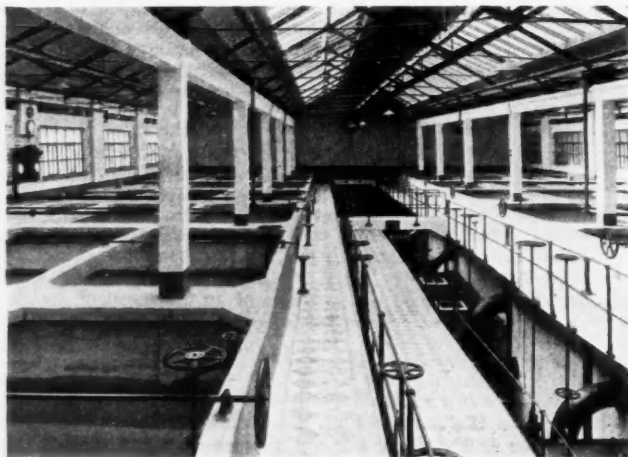
(3) Oil film air filters are to-day probably the best-known and most widely-used type of air-cleaner. A well-constructed sticky filter has all the advantages of the dry cloth type without their corresponding disadvantages. The filtering efficiency is very high, even when dealing with fine carbon or soot, being in the neighbourhood of 98 per cent. There are now many different makes on the market, but they nearly all embody some of the features, such as the sectional form, of the original oil type Visco air filter, of the Visco Engineering Co., Ltd., 162, Grosvenor Road, London.

The maintenance and running costs of this type of air filter are exceedingly low, being limited to the oil used to cover the filtering media, and the labour involved in washing and re-oiling the dirty cells. In a filter of 50 cells, having a capacity of 30,000 cub. ft. per min., it is only necessary to clean 5 cells every week. The dirty cells are removed in rotation and replaced by the spare cells usually provided, this operation taking only a few minutes. The dirty cells are washed bodily in hot soda-water, or they may be cleaned by means of a steam jet, when this is more convenient, after which they are immersed in a bath of suitable oil for a short time. The surplus oil in the cells should be drained off for at least 24 hours, when the latter are ready for use as spare cells when the next batch of dirty cells are removed from the filter.

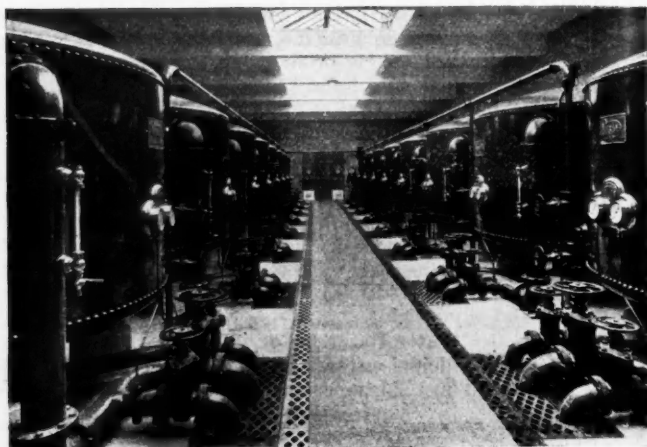
An interesting development of this type of filter is the "Visco" duplex filter, in which two cells are arranged in series. The primary cell is of the standard design and mesh, while the secondary cell is of much finer mesh. If the efficiency of the primary cell is 98 per cent., as is claimed, and the efficiency of the fine secondary cell is the same, then it follows that the over-all efficiency of the Duplex filter is practically 100 per cent. This filter is of special value when bacteria-free air is required, such as in hospital operating theatres, food manufactories, breweries, etc. In such cases a special sterilising preparation is used to coat the filter cells instead of the usual oil.

Paterson Engineering Co., Ltd.

A number of important contracts, at home and abroad, have been executed during the past year by the Paterson Engineering Co., Ltd., Windsor House, Kingsway, London,



PATERSON EXCESS LIME PURIFICATION PLANT AT LANGFORD (SOUTHEND WATERWORKS CO.). CAPACITY 6,000,000 GALLONS PER DAY.



PATERSON PRESSURE FILTERS AT THORNTON (CITY OF BRADFORD WATER DEPT.). CAPACITY 2,000,000 GALLONS PER DAY.

in connection with water purification and filtration undertakings, and their chlorination apparatus has been widely adopted by power stations and other large industrial users of water.

The method of rapid sand filtration has been the subject of constant experiment and improvements by this firm for over 25 years, and single units have been produced with a capacity up to two million gallons in 24 hours. The percolation of water through a rapid sand filter with modern methods may be up to 50 times as great as with the old sand filter, and the cleansing of impurities from the filter is radically different. With the slow filter this is done by scraping the surface or excavating the bed, whereas in the Paterson rapid sand filter the cleansing is carried out by agitating the filter bed with compressed air admitted from below.

Where the water contains finely divided impurities, a coagulant has to be provided to assist the filtration process. Straining through sand arrests only the grosser impurities, while colour, clay and fine suspended matter pass freely through until the filter is filmed, a natural process in the case of the slow sand filter which may take several weeks to complete. Rapid filtration brings about this state more speedily by the addition of a coagulant such as sulphate of alumina.

There are both gravity and pressure types of rapid sand filters, the pressure type being so named because it can be interposed on a pressure main without breaking the hydraulic gradient and without occasioning the necessity for repumping. In addition to the gravity filter (up to 19 ft. diameter) and pressure filter (up to 9 ft.), the Paterson Co. also supplies the horizontal pressure filter. The vertical pressure filter is in practice limited by pressure considerations to a diameter of 8 or 9 ft. The Paterson system of air cleansing, by dispensing with all rotating stirrers, removes the limitations as to shape and size of the filter bed.

Feinc Continuous Rotary Filter

Although the de-watering of chemical products by means of continuously operating filters has already been in process of development for a number of years, the treatment of colloidal materials on rotary filters has hitherto been impossible. The problem has been solved by means of the Feinc Filter, a product of the Filtration Engineers Incorporated of New York. The manufacturing rights for Europe are held by the Maschinenfabrik Imperial, G.m.b.H., of Meissen, Germany, whose sole British representative is Mr. L. A. Mitchell, of 37, Peter Street, Manchester. The Feinc Filter treats with equal success all slurries found in either the chemical or the mining industries, quite independent of the size of the particles of the solid material.

After the period of dry suction the discharge of filter

cake in previous types of filters is mostly effected by a scraper. The mechanical sequence of the scraping process is as follows: In order to protect the filter-sieve, a wire screen is placed round the sieve, the scraper bearing on this screen. This results in a layer of material corresponding to the thickness of the wire always being left on the filter. Even with very permeable materials—e.g., lime—the passages in the protecting layer in course of time become so restricted by the effect of the scraper, that the flow of liquid, and hence the output of the filter, are reduced. The material has to be fed without interruption, and the protecting layer has to be washed away through the interior of the filter. Thus the continuous operation of the filter is broken. In modern designs, efforts are made to remove the protecting layer continuously by the introduction of compressed air at the back of the filter. This, however, is only possible with a certain number of materials.

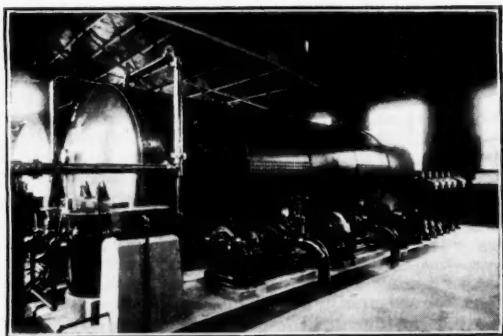
As the adhesion between the filter cloth and the filter cake becomes excessive the layer of material is blown off without any regularity. At many points the filter cloth opens, so that an equilibration of pressure occurs through the openings, and consequently any filter cake remaining on the filter cloth is deprived of the effect of the compressed air and is not removed. To ensure complete removal of the cake, the scraper must, however, be adjusted as closely as possible to the filter cloth, in which case the cloth is either clogged or damaged.

To overcome this doubtful method of discharge, the very ingenious principle of the Feine Filter was evolved: a system of endless cords encircles the filter drum and is then led under a number of rollers, according to the conditions obtaining. During the filtering process, the cords are embedded in the filter cake and pass with the cake through the de-watering zone, finally removing the cake from the filter cloth as carefully as possible.

Thus, it is possible to discharge from the filter, layers of material even as fine as 1 mm. without leaving any residue. This is a matter of special importance in the filtration of colloidal materials, which form cakes of such low permeability that even with cake thicknesses of only a few millimetres the passages for the liquid are choked by the cake. Even when the duration of the filtering process is increased several times a thicker cake cannot be produced! With such materials, it is of prime importance that with every repetition of the filtering process—i.e., with every revolution of the filter—the filter cloth should be completely cleaned by immersion in the liquid.

Candy Filter Co., Ltd.

The mechanical filters of the Candy Filter Co., Ltd., Church Road, Hanwell, London, who for thirty years have specialised in the purification of water supplies, are divided into two main types—the gravity type, in which the filter bed is in an open tank, and the pressure type, in which it is in a closed cylinder. The suitability of either in any particular case depends on the local conditions. Pressure filters again can be divided into the horizontal and vertical types, of which,



PLANT OF FIVE CANDY HORIZONTAL FILTERS DEALING WITH HIGHLY COLOURED WATER, INSTALLED FOR WAKEFIELD CORPORATION.

for large installations, the horizontal filter is more economical both in first cost and in running costs. The Candy Co. claim to have been the pioneers of this type. Our illustration shows a plant of five Candy horizontal filters installed for Wakefield Corporation. They are dealing with highly coloured water and giving consistently good results at remarkably low running costs.

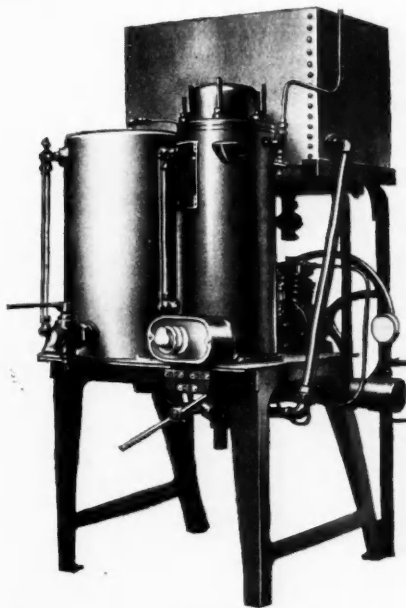
The Candy rapid gravity filters have patent automatic controls which ensure a constant filtration rate, automatic slow starting of the filters after washing out, and no waste of water during shutting down for washing. The Candy patent filter floor provides an absolutely even scouring of the filter with air and wash water during the washing process. The average quantity of water used for washing out does not exceed 1 per cent. of the water filtered. A notable example among the many plants of this type installed all over the world is that at Walton for the Metropolitan Water Board, having a capacity of 20 million gallons per day.

In the field of chlorinators the Candy Filter Co. has developed many new types of manual control and automatic proportioning type gas chlorinators. These plants are extremely accurate, reliable in operation, and easy to maintain. They provide chlorination for public water supplies to ensure bacteriological purity, and for power house work to prevent growths in the condenser cooling water. A plant of this type is installed at the Lots Road Power Station, and numerous other examples of Candy products, all rigorously tested at the firm's special testing plant at Hanwell, are to be found in factories and works where clean water is an essential.

Stream-Line Filter Co., Ltd.

THE method adopted by Dr. Hele-Shaw (technical director of the Stream-Line Filter Co., Ltd.) of edge-filtration between paper discs is now well known, and many hundreds of filters on this principle are in regular use.

The reconditioning of used lubricating oils is the most generally interesting application. Filters are made both for



SELF-CONTAINED STREAM-LINE FILTER FOR OIL PURIFICATION.

direct attachment to engines and for independent use, and it is of interest that numbers of the former type have been fitted by engine makers to clients' new engines. Ruston and Hornsby manufacture such filters under licence for use with their engines. Of the independent self-contained filters for large engine equipments and garages, the o8 model (illustrated) is typical. Dirty oil poured into the upper tank is filtered under vacuum into the clean oil receiver, the vacuum pump being shown in the photograph. The same pump

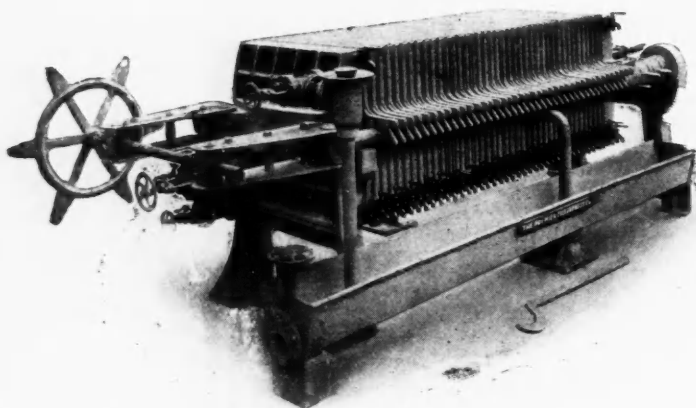
provides compressed air for cleaning the filter, this being done by the movement of the control lever shown, without any necessity for opening up.

An innovation in the past year has been a smaller self-contained plant operated under pressure and suited to the needs of the smallest engine user, so that no oil-consumer need be without one of these filters, which deliver used oil absolutely free from colloidal carbon or other suspended impurity, fit for re-use continually. The smallest filter of this range has a single filter column and deals with 5 gallons a week. It can be left running for 24 hours without any attention whatever and being operated by a charge of compressed air, it has no moving parts.

The Stream-Line filter has been applied with equal success to the purification of insulating oils. The equipment of the 15 sub-stations of the Central Scotland Grid Scheme is now nearing completion, and test results from completed stations have been very gratifying. A smaller portable set has been supplied to a number of municipalities. Strikingly high breakdown voltages are recorded for oils passed once through this type of filter, and the closed equipment, which does not need opening up for cleaning, replaces both centrifuge and blotter press. In the chemical industry the Stream-Line filter has many applications, more especially to cases where the clarity of the filtrate is the primary essential. A useful range of laboratory units is available for the testing of individual requirements.

The Dehne Filter

In spite of the large number of new appliances that have been put on the market during the last few years in connection with filtration, the filterpress still holds its own, for reasons not far to seek. It offers a very large filtering surface as compared with the floor space it occupies and, what is perhaps even more important, the filtration can be carried out under whatever pressure is found to be most suitable, from a light gravitation pressure up to 8 to 10 atmospheres, or even higher. One of the best known is the "Dehne," which has been before the public for over 70 years, and has been supplied to some of the largest works all over the world. The filtering surface in these presses consists of vertical corrugations cast specially deep, which, while affording an ideal support for the filter-



A DEHNE FILTER PRESS.

cloth, do not allow the cloth to sink into the corrugations and thus impede the flow of filtration. This is important, not only because of the increased capacity in filtration, but because the life of the cloths is thereby lengthened, there being no perceptible strain on them during the filtration process.

The Dehne press is made in either the flush-plate and distance frame type or the recessed plate type, each having its own advantages. There are also special patterns for unusual purposes, the most important of these being the steam-heated or brine cooled patterns. In these there is a coil cast into the solid plate through which steam, hot water, brine,

etc., is passed, and by this means the whole of the press can be kept at any desired temperature without the slightest risk of steam or condensed water getting into contact with the material being filtered.

An efficient tightening gear is extremely important in filter-presses, so that there is no leakage while filtration is proceeding. With the smaller presses, *i.e.*, those with plates up to 25 in. square in iron, and 30 in. in wood, the usual closing is by means of a fixed or rotary centre screw, but with the larger presses the angle-lever shutting arrangement is used, by which a 1,500-fold transmission is obtained, and which is so simple that it can be operated by one man.

The filterpress illustrated shows this tightening gear, and is provided with the thorough-extraction washing system, another unique feature of the Dehne presses. By means of this practically every trace of soluble matter can be washed out of the cake after it has been formed in the press. The washing really consists of vertical sheets of water passing horizontally through each cake, so that every corner of the cake is washed and there is no tendency for the wash water to make a channel through the cake. The wash water can be passed through the cake in four different ways although it is very seldom that more than one is required. The sole selling agents for this country and the Overseas Dominions for the Dehne presses are the Premier Filterpress Co., Ltd., of Finsbury Pavement House, Moorgate, London.

Browns' Dryers, Ltd.

Air filters of low initial cost, compact and with many advantages in actual use, are supplied by Browns' Dryers, Ltd., 17, Victoria Buildings, Deansgate, Manchester. The filter screens are made of special incombustible material, the fibres of which project on all sides, and are so placed that the fibres intermingle, forming a loose but very efficient filter mesh. Air can pass freely through at a moderate speed with practically no resistance, but it is perfectly cleaned and only dry air passes. The entire filter, with a capacity of 30,000 cu. ft. per minute, requires only a space measuring 167 cu. ft., or less than one-sixth of that required for an ordinary cloth filter. Cleaning of the filter screens is a simple operation, and is recommended every three to twelve weeks according to the amount of dust removed. The dirty screens are taken out, replaced with a spare set and cleaned with a vacuum cleaner or compressed air apparatus, or, if greasy, can be immersed in an alkaline bath for a short time. They can then be used to replace other dirty screens in another casing, so that only one spare set of screens is required for a large filter.

Wolfe Keene and Co.

Wolfe Keene and Co., of Hull, were among the pioneers of modern filtration development, and they hold numerous patents for rotary vacuum filters and rotary pressure leaf filters covering the most advanced practice. The principal characteristics of their latest development, the rotary pressure leaf filters—which are made in various sizes and have a capacity up to 1,000 sq. ft., total area—are provision for perfect cleansing operation, removal of the filter leaves, flexibility of control and removal of extraneous matter in either sludge or cake form, whichever is preferred.

A wide range of materials is used in construction, including anti-corrosive materials of every description, more particularly "Staybrite" steel and Monel metal, from which some important contracts have recently been carried out. A feature of their rotary filter is that the drainage cells from the filter compartments terminate on the periphery rather than on the face or end of the rotating trunnion shaft; as with other drum filters. The main details of construction involve a continuous compressing endless belt acted upon by reciprocating weighted rollers to mangle and iron out the cake, which is totally submerged for washing. The compressor belt is stretched and supported by four fixed idler rollers, which also tangentially direct it upon the coke on the ascending side of the drum and tangentially withdraw it from the descending side to return for continuous operation. This belt is porous enough to admit sufficient air to combine the drying effect of compressing and air drying, and is driven at similar speed to the

filter drum, owing to surface tensions no separate drive being required.

As regards drainage no pipes are used, and consequently corrosion and joints are eliminated. A suction and/or pressure communication to the filter compartments is provided through either one or both of the drum-end plates having radial cores diverging from the central cellular facing, to which is mounted in the usual manner a trunnion shaft with communicating cells leading to an automatic vacuum and pressure distributing control valve. Shallow filter compartments of minimum depth and volume are provided and the drainage is ample even when reduced to $\frac{1}{8}$ inch.

Jena Glaswerk Schott und Gen

Jena Laboratory Glass discs, manufactured by the Jenaer Glaswerk Schott und Gen., possesses unusual chemical properties which render them highly efficient filtration media. They are made as a rule of high-class laboratory glass of a low coefficient of expansion, perfectly insoluble in water and acids, and only slightly attacked by alkaline liquids.

In the manufacturing process this glass is ground to powder in ball mills, carefully sifted to certain grain sizes, and the sifted powder is formed into porous discs by sintering in clay moulds. The porous discs are then fused into glass containers made of the same glass. The glass containers may be shaped in any desired patterns fitted for the special kind of chemical work, the size of the pores being chosen to meet the wishes of the chemist. The fusion of the filter discs into the clear glass vessels may be done by hand with a blowpipe, or on a lathe specially devised for this purpose.

The degree of porosity in these glass filter discs is not determined, as in the case of porous clay or kaolin filters, by mixing with organic material such as sawdust or sugar, this being burned out and thereby forming the pores; but entirely by the size of grain of the glass powder employed. The larger the grains of glass, the larger are the pores left open when the powder is sintered. In this way it is possible not only to make filters with very small pores of 2, 5 or 10 microns average diameter, but also filters with 50, 100 or even 200 microns diameter.

The filters are fused directly into container vessels of appropriate shape and made of transparent glass. Among the purposes for which they are suited are the filtration of precipitates, analytical work, the filtration of gases, the filtration of mercury, and the distribution of gases in liquids. The filters are able to stand temperatures of from 15° to 600° C. For higher temperatures up to 1,500° C. the Jena quartz filters can be used.

Bell Brothers (Manchester 1927), Ltd.

Much scientific research during recent years has resulted in the evolution and perfection of mechanical pressure water filters, various types of which, giving a high efficiency in filtering and washing, are manufactured by Bell Brothers (Manchester, 1927), Ltd., Denton, near Manchester. Briefly, the standard "Bell" filter comprises a mild steel shell, inside of which is the special system of strainers, so arranged that when in operation the whole of the filter bed is active.

The agitation of the filter bed when being washed is effected by means of a hollow hydraulic shaft running down the centre of the shell, to which are attached hollow arms. These arms are provided with rakes extending to within a minute distance of the inside of the shell, and also with a row of small valves. When washing the filter, the bed is first put into suspension by a reverse flow of filtered water and the shaft and arms are then revolved either by hand or by mechanical means, and at the same time a current of water is forced down the hollow shaft and arms and out through the back pressure valves, thus forming strong jets which further agitate the sand, thoroughly scouring and removing all the particles of dirt which are carried away by the reverse flow of water.

This system of washing is claimed to give an infinitely greater efficiency than that obtained by the use of compressed air for agitation. In the latter case the air, like the water, will find the easiest path through the bed, and thus cause "dead spots" to form, which, in time, become so foul as to

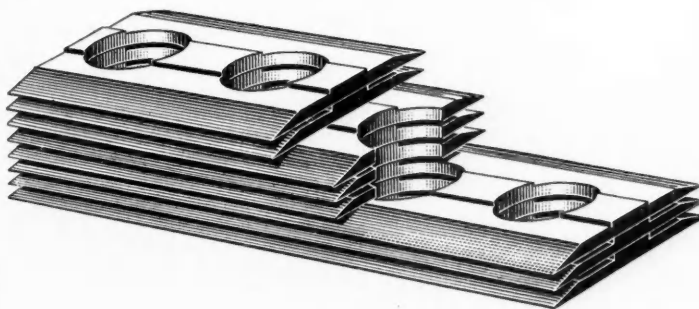
necessitate the changing of the sand. It may be noted that slow sand filters have been replaced by pressure filters at the Stirlingshire and Falkirk Water Board (4 plants), Darlington, Macclesfield and Bacup, and in the case of the Newcastle and Gateshead Water Co. and Wrexham, extensions to existing slow sand filters took the form of pressure filters in preference to slow sand filters.

There are many and varied problems arising out of the treatment of water supplies, and in many cases filtration has to be supplemented by suitable chemical treatment in addition to using a coagulant. Apparatus is therefore available for use in conjunction with pressure filters for the addition of chalk, lime, soda, etc., as may be necessary. The "Bell" system of adding chemicals is extremely efficient and permits of the utmost control over this section of the plant. Bell Brothers have also just placed on the market a new type of chlorinating apparatus for adding gaseous chlorine to water supplies.

In addition to the plant mentioned, their products include mechanical pressure filters specially adapted for industrial purposes, filtration, aeration and heating apparatus for public swimming baths, intermittent, continuous and base exchange water softeners, and small filters for use in villages, residences, etc.

Metafilters, Ltd.

Filtration by means of Metafilters is a new system, applicable, not in one direction only or to a single product, but to practically any industry or operation in which filtration is required. In some cases, the special details of the Metafilter give it great advantages over filters at present in use, which it is displacing for many duties. The basis of all Metafilters lies in filtering members which are built up from a number of Metafilter strips or rings. These filtering members may be of almost any size from many square feet down to a few inches, and they are varied in their shape, disposition and method of attachment to suit the requirements of the most varied duties. Metafilter filtering elements may be built in practically any material. The following is a partial list of some of the more useful materials:—Brass, copper, ebonite, gunmetal, mild steel, monel metal, stainless steels, tin and zinc.



THE METAFILTER PRINCIPLE.

The mechanical arrangements of the filters, of course, follow the needs of the actual duty which is being undertaken. The filters may be designed to work under pressure in closed containers or under vacuum in open containers, and, generally speaking, filters can be built with the Metafilter unit as the essential part of the filter, the other details following the general lines of almost any other type of filter employing cloth or other medium.

The special strips of which Metafilters are built are usually flat on one side, the other side having bevelled edges. Along the central flat portion of the bevelled side a rib of precise and uniform height is provided. The strips are perforated down the middle, the holes being of greater diameter than the rib, so that they overlap it on both sides. The filter is made up by holding tightly together a number of these strips—flat surface to bevel surface. The strips are capable of variation in several directions to suit any special needs. The length of the bevels may be varied to give a deeper or more shallow filterbed. The height of the rib may be varied so that the

separation of the strips may be made greater or less, and the overall thickness of the strips, as well as the material of which they are made, can also be altered.

When the strips are piled upon one another and tightly held in contact, as illustrated diagrammatically, the perforations come into register and form internal drainage channels through the whole assembly. The strips are separated by the precise height of the ribs, which may be .0005 to .0030 in. The liquid which is being filtered is caused to pass from the wide end to the point of the V-shaped grooves into the internal drainage channels, solid matter being retained in the lower member of the frame communicating with a spigot.

The Dorr Co., Ltd.

The use of continuous vacuum filtration has been extended from its first use in metallurgical plants to all types of chemical and industrial plant, and it finds highly successful application in the Dorrco filter, the product of the Dorr Co., Ltd., Abford House, Wilton Road, London. The standard machine is a continuous vacuum filter of the rotary drum type, with the filtering medium on the inside of the drum. The drum, which serves also as the pulp container, is closed at one end, the other end being open to permit discharge of the filter cake and observation of the filter operation. The inside of the drum is fitted with a heavy screen which supports the filter cloth. This screen is so arranged that a space exists between it and the drum shell to allow free drainage of liquid drawn through the cloth. The filtering surface is divided into several panels, running parallel to the axis of the drum. The filter cloth is fastened into grooves at the ends of the drum, and along the partition channels which separate adjoining panels. The whole cloth or any portion of it can be removed and replaced quickly.

The panels are connected to a main valve which admits pressure and vacuum to each panel in the proper sequence. The drum is rotated in a clockwise direction through worm gear and worm, the worm shaft bearings being integral with, and part of, the trunnion bearing, to insure rigidity and alignment. A cake discharge hopper is mounted inside the drum on supports which extend through both ends of the drum and rest on the foundation. The hopper is fitted with a conveyor which continuously removes the cake and discharges it through the open end of the drum.

Vacuum is applied between the shell and the filter cloth, causing the formation of a cake on the cloth. As the drum revolves, the cake is dewatered, and washed when desirable, until it reaches the discharge point near the top of the drum. At this point pulsations are applied to the filtering medium, causing the cake to fall freely from the cloth into the discharge hopper, whence it is removed by the conveyor or chute.

The Dorrco salt filter is especially designed to dewater and dry crystalline materials, such as salt, tri-sodium phosphate, sodium nitrate, ammonium phosphate, etc. It is made up of a number of panels, each panel consisting of a heavy cast iron section, backing screen, and section of filtering medium. The latter is usually made of Monel metal. Each one of these panels may be removed from the drum independently, and replaced by a spare if necessary.

F. Jahn and Co.

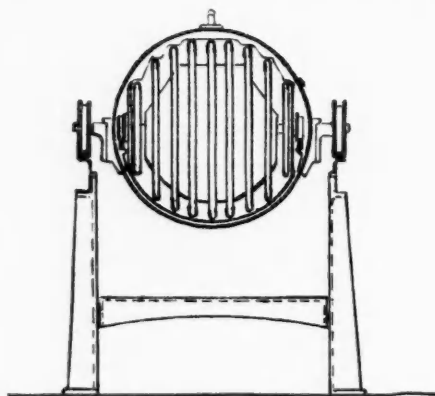
For certain purposes, a rotary vacuum filter is not applicable, especially where filtering hot liquors and cold liquors, with very fine matter in suspension. The totally enclosed "Mammoth" pressure filter of F. Jahn and Co., 15, Britannia Street, King's Cross, London, will come in usefully where large outputs are required, for instance (seven tons per hour), of crude glycerine from treated soap lyes with one man to attend to the machine. The usual filtercake is deposited on the cloths, but on opening the "Mammoth" press, the cake is automatically discharged by means of wires and brushes stretched across the filtering surfaces, and the adhering sludge automatically scraped off the cloths and dropped into a pit so that another filtering period can be immediately proceeded with. Further means are provided for introducing compressed air or steam, inside the double filter leaves and in rapid alternation exhausting the inner filter frame space. In this way the cloths can be given a shaking movement, for definite cleaning and flush cleansing, whilst in working positions. The rectangular filter

frames, cloth covered, are a fixture with the stationary head of the press, whilst the covering shell, with one joint ring only, is removable on outside wheels.

Pressure can be exerted up to 100 lbs. per square inch. The end weight of the large double leaf filter frames is carried by wheels on rails fixed inside the shell. The patented arrangement of the filter frames assures a larger filtrate flow per square foot filtering surface than has been possible in a filterpress hitherto. At present this machine is made at Colchester in one size only, having 400 square feet filtering surface.

For continuously working, in sugar factories, for instance, the "Mammoth" pressure filter is built with a hollow central revolving filtrate shaft (easily accessible), on which are mounted filter frame units as described above, in easily removable segments of tennis racket or fan form (cloth covered) to make up discs. Whilst these composed discs revolve in the liquor to be filtered, under pressure, the sludge and filter aid are continuously brushed off the cloths. The sludge is discharged continuously, to be washed separately and dealt with in a second filter. No water is added to the liquor, for sluicing.

Another Jahn patent refers to a decolorising charcoal pressure filter, with labyrinth path flow, with a view to prevent "ruisseleting." Jahn's third novel construction is the



CROSS SECTION OF MAMMOTH FILTER PRESS.

"Ultrameta" pressure filter for liquors which contain only minute amounts of solids or slimes suspended. There are no sieves whatever in this construction. This central screw type machine is suitable for pressure up to 60 lbs. per square inch and consists of a number of 20 in. diameter pairs of stationary discs made of bronze or aluminium alloy, which are deeply recessed and spirally grooved. Between each pair of discs is placed a 2 in. thick cotton, flax or asbestos fibre medium cake. The cloudy liquor is fed into the grooves of one disc, passes through the 2 in. thick layer of filtering fibre, where all suspended matter is retained, and the clear liquor collects along the deep grooves of the opposed disc, continuing through a top filtrate channel for delivery from the press. Return flow flushing can be done. Rubber joint rings keep the discs liquor-tight from each other. Such a filter with four pairs of discs and 1½ in. feed will be suitable for an output of 500 gallons per hour, pressure-fed with a duplex steam pump. A suitable fibre medium washer, fitted with fibre disintegrating propeller and a handpress for remaking the fibre medium cakes, after their wash-cleaning, are supplied with the "Ultrameta" to make the filtering outfit complete.

Seitz' Alluviation Filters

Despite the fact that they have only been introduced into the chemical industries for a comparatively short time, the Seitz' filters have proved very successful, and many installations have been made throughout the world. As time goes on, these filters will undoubtedly be as popular in the chemical industries as they are to-day in the wine and spirit trades, to which over 100,000 filters have been supplied.

In the Seitz apparatus the filtering material, which consists of a finely divided mixture of asbestos and cellulose, is

alluviated on to fine wire gauzes which form the essential parts of the filtering elements. Prior to this alluviation process, the filtering material is intimately mixed with a portion of the liquid to be filtered. In this mixture, the asbestos absorbs the finest suspended particles, so that the filtering layer formed consists not only of the filtering material, but also of the finest matters held in suspension. It is this structure that gives the layers their extremely "fine" filtering properties. In addition, the output obtained is very great. Seitz' filters are eminently suitable for the filtration of large quantities of liquid containing only small amounts of suspended matters, and these can be dealt with both cheaply and efficiently. Installations made include the following:

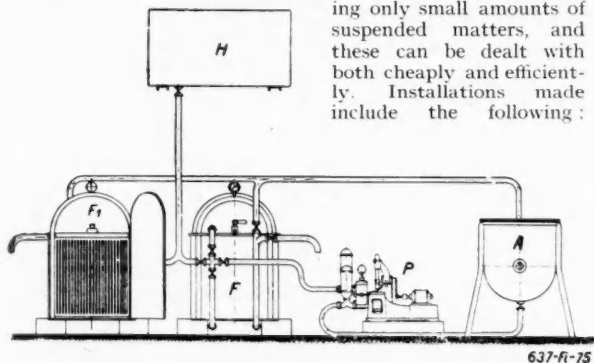
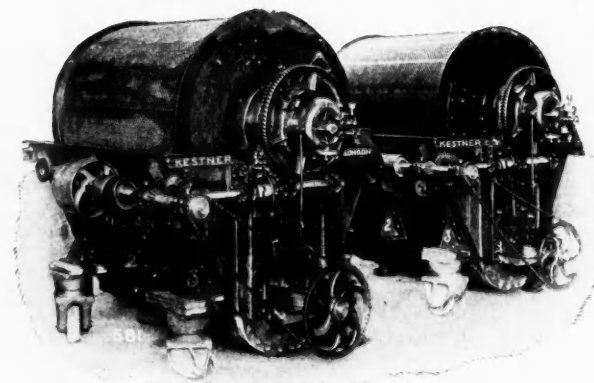


DIAGRAM OF SEITZ FILTER PLANT, SHOWING FEEDING TANKS, PUMP AND FILTER (F₁)

Plant with a filtering surface of 180 sq. metres in an artificial silk factory, for water; one with 660 sq. metres in a beet sugar refinery; another with 216 sq. metres in an oil refinery; and 144 sq. metres for a spinning bath in an artificial silk factory. The chief advantages of these filters may be enumerated as follows: very sharp filtration, cheap working, small space requirements, quick and easy cleaning and very little supervision requirements. The agent for the Seitz' filter is John C. Carlson, 149, Farringdon Road, London.

Kestner Engineering Co.

The Kestner Evaporator and Engineering Co., Ltd., have for a long time manufactured rotary vacuum filters of the continuous type for use in various industries. Filtration requirements are so variable that the best results in any one case cannot usually be obtained with a filter of standardised design. Furthermore, it is frequently necessary to modify designs considerably to enable the filter to be built of materials able to withstand chemical attack by the liquids that have to be handled. The Kestner Co., who have had a wide experience in dealing with all types of chemical plant,



KESTNER ROTARY VACUUM FILTER WITH ROTARY AGITATORS.

consider each filtration problem independently and, while maintaining the general principles upon which their filters are designed, modify the details to suit each particular case.

Totally enclosed filters are built to deal with materials containing volatile constituents, the air circuit being arranged

so that the vapours removed by the vacuum pump are returned to the filter casing. Filters with a special type of agitator are built to handle slurries containing a large proportion of heavy solids and small filters are built with the drum constructed from a single casting in special alloys for use in the manufacture of fine chemicals.

The method of securing the filtering cloth to the filter drum is varied to suit the type of cloth that has to be employed and the frequency with which it has to be renewed. By treating problems in this way, many of the difficulties associated with the use of continuous rotary vacuum filters have been overcome.

The continuous rotary vacuum filter is not suited for every purpose, but in the Kestner Co.'s experimental works there are facilities for carrying out tests on a small scale plant to determine which is the best type of filter to adopt and the Kestner technical staff are always pleased to collaborate with works chemists on any particularly difficult filtration problem.

Oliver United Filters, Ltd.

After several years' experimental work, four distinct types of filters have been added to the range manufactured by Oliver United Filters, Ltd., 150, Southampton Row, London, and can now be supplied in a number of sizes.

Two of these are for handling granular material which could not previously be handled on rotary filters, such as salt, both vacuum and grainer, concentrating table concentrate and tailings, nitrate of soda, copperas and practically all crystalline materials. Many plants have been supplied and are giving every satisfaction with large outputs and low cake moistures.

The other two new Oliver filters have been developed to operate in cane sugar mills on mud settlings and are proving equally successful, plants being in operation or on order for Brazil, Philippine Islands, Argentine, Porto Rico and Mexico. Oliver filters for cyanide and mining plants, sugar refineries and beet sugar factories, pulp and paper mills, chemical works, and miscellaneous products, have been improved and many devices have been added to suit individual products.

A special type of Oliver disc filter has been perfected to handle a large flow of liquor, and another type has been designed to handle cement slurries. The Sweetland pressure filter is largely used in sugar refineries and is equally successful in handling inflammable and volatile liquids and those giving off poisonous fumes. Owing to its construction, excellent cake washing is obtained. The Kelly pressure filter is particularly adaptable where high pressures are required and is largely used by oil refineries. The Borden and Sweetland Thickeners are used in beet sugar factories, effluent plants and in cases where the filtrate from the thickener must be perfectly clear. Oliver products are made in many different sizes, and the firm is able to offer a suitable plant for practically any product.

Premier Cooler and Engineering Co., Ltd.

The efficiency which has been reached in the rapid cleansing of large volumes of air to meet modern industrial conditions is well exemplified in the wet, dry and adhesive air filters of the Premier Cooler and Engineering Co., Ltd., Shalford, near Guildford, Surrey. The dry air filter, regarded purely as an air cleaner, is undoubtedly more efficient than an air washer or "wet-filter." It is simpler, less costly, does not need power for pumping and may be rendered quite fireproof. But it cannot meet a demand for air-cooling. In addition, therefore, to their dry air filter, which is made in twenty-five standard sizes and with a capacity up to 70,000 cu. ft. per minute, the Premier Co. has developed its air washer on scientific lines.

This apparatus, as its name implies, washes the air by bringing it into intimate contact with water atomised by a series of spraying nozzles. Water and air are brought into intimate contact and with all impurities thoroughly moistened the heavier matter falls to the bottom of the tank.

Zig-zag scrubber plates, made of perforated zinc, or other suitable material, are continually drenched by the atomised water from the sprays, carrying the impurities contained in the air. The mixture strikes these plates at an acute angle, and the dirt is scrubbed out and conveyed to the bottom of the

tank by the film of water running down the plates. The washed, but still moisture-laden, air passes on through the numerous small holes in the perforated scrubber plates to a series of eliminator plates consisting of several rows of staggered and lipped plates alternatively inclined in opposite directions.

These eliminator plates have a deflective action, altering the course of the air many times and causing it to deposit all free moisture before leaving the washer.

Another important type of air filter is the "Adhesix" which employs oiled surfaces to catch the dust, etc., contained in the air passing through it and filters by impingement, not by restriction. The filtering surfaces consist of sheets of expanded metal of special formation and spacing, built up into easily removable and interchangeable cells. Each cell is dipped into a bath of special non-volatile oil which adheres uniformly to the surfaces, both sides of which are effective. The solid impurities adhere to the viscous coated surfaces, which can be quickly and effectively cleaned. A number of cells are used depending on the volume of air to be dealt with and spare cells obviate suspending the operation of the filter during cleaning.

Evans, Adlard and Co., Ltd.

The date of the origin of Postlip Mills, at Winchcombe, Cheltenham—the home of one of the best makes of English filter papers—is unknown, but they were running in 1752, and nearly a hundred years later passed into the hands of the present owners, Evans, Adlard and Co., Ltd. The purity of the water supply of the district has given it outstanding advantages for the manufacture of paper, in particular blotting paper, and "Postlip 633" has gained an international reputation. Filter paper has been one of the firm's foremost lines for over half a century. It was difficult to persuade British chemists to use these papers extensively before the war, as German filterings were then much in demand. The outbreak of war, however, gave English makers a chance which had hitherto been denied them, and so effective was the result that German filterings are rarely asked for now in the home markets. Evans, Adlard and Co., Ltd., were one of the first to seize the opportunity, with the result that their trade in Postlip filtering has increased enormously. Postlip filter papers are made for the purpose of analysis, for technical and pharmaceutical work, and for work on sugar and fruit juices, colours and oils, varnishes, heavy liquids, etc.

"By-ways of Chemistry and Industry"

THE opening meeting of the Edinburgh and East of Scotland Section of the Society of Chemical Industry was held jointly with the local section of the Institute of Chemistry in the Pharmaceutical Society's Hall, Edinburgh, on Monday.

The chairman of the Section, Mr. G. F. Merson, delivered the inaugural address, taking for his subject "Some By-ways of Chemistry and Industry." He had opportunity, in the course of a business tour round the chief Dominions, of seeing at first hand the progress which had been made during recent years in the way of scientific application of the work of the trained chemist to the problems of everyday commercial manufactures. The highways of industry—our major manufactures—he submitted, could absorb only a small percentage of the trained chemists sent out from the Universities and technical colleges year by year, and he suggested that many openings, well worthy the attention of chemists, existed in the minor industrial world. Edinburgh within its area had probably a wider range of minor industries than any other city in the Empire. Though many of them were not large, they were, in their way, of first-rate importance.

New Wood Preserving Plant for Czechoslovakia

PLANS are being made to establish in Breznice, Bohemia, a wood-preserving plant of 25,000 cubic metres' annual capacity, reports the U.S. Assistant Trade Commissioner at Prague. The surrounding forest can supply at least 70,000 cubic metres of wood annually, of which about half would be suitable for treatment. The pines of this region are even better than the well-known Sumavafines for telegraph, telephone, and electric light poles. The Ministry of Posts and Telegraphs, Ministry of Railways, the Skoda Works, and the Electrical Corporation will participate in the company which will be capitalised at 3,500,000 crowns.

Zinc-Copper Developments in Manitoba New Concentrator Plant

OPERATIONS have been begun at the large concentrator at the Flin Flon zinc-copper mine in northern Manitoba. No unexpected difficulties are stated to have been encountered, and the operations now in progress are preliminary to the inauguration of full-scale mining operations during the coming winter. At the moment the mill is running at a daily capacity of 500 tons of ore, but when all the units are working the capacity is expected to reach 3,000 tons per day. The ore going through the mill is being taken mainly from the open pit mine, only a very small portion coming from underground. As the smelter is not yet ready for operation, concentrates are being stored.

The present plant of the Hudson Bay Mining and Smelting Co., in which the Whitney interests of New York are investing about \$30,000,000, calls for a daily production of 2,000 tons of ore from the open pit and 1,000 tons a day from the 650-foot level as soon as the plant is ready to handle this large tonnage. The metals produced will be copper and zinc, together with gold and silver, production coming from an ore body situated partly in Manitoba and partly in Saskatchewan, the mining and concentrating plant straddling the interprovincial boundary. The power house and converter plant and one-half of the zinc leaching plant are situated in Saskatchewan; one-third of the concentrator is in Saskatchewan; and the rest of the plant is in Manitoba.

Electrical power for the operation of the mine is being brought 50 miles from the Island Falls plant on the Churchill River in Saskatchewan, where a subsidiary company, the Churchill River Power Co., has an initial installation of 44,000 h.p. developed mainly for the operation of the Flin Flon mine and smelter, for lighting purposes, and also for the transmission of power to the Sherritt-Gordon mine and concentrator at Sherridon, Manitoba.

Market for Insecticides in Porto Rico

THERE is a fair market in Porto Rico for agricultural insecticides, particularly among the citrus fruit and tobacco growers. In the cultivated citrus fruit orchards and the tobacco industry, considerable Bordeaux mixture is used. Some buy the mixture prepared, but others buy the ingredients and do their own mixing.

A list of the chief agricultural insecticides and fungicides used in Porto Rico follows: Copper sulphate (for Bordeaux mixture); copper sulphate (ready-prepared with lime and water); calcium arsenate (insecticide, liquid or dust); lead arsenate (insecticide, liquid or dust); Paris green (insecticide—especially tobacco); nicotine sulphate (liquid or dust, against aphids in coffee); petroleum distillate (used against scale insects); copper lime arsenate (used against fungi); carbon bisulphide (fumigating fruits); potassium cyanide (fumigating tobacco warehouses); carbolic acid (used against ants) sulphur and prepared lime (compound, fruit spray); para-dichlorobenzene (disinfect rot and borers); ethylene gas (colouring citrus fruits).

Italian Imports of Benzol

THE dyestuffs and rubber industries in Italy consume considerable quantities of benzol, although its use in other directions is limited. Austria supplied over one third of the amount imported in 1929, but the United Kingdom appears to have no share in this trade. Imports of benzol, including minor quantities of toluol and xylol, from various countries last year are shown.

Countries of Origin.	Metric Tons.	Lire.
Austria.....	2,743	5,541,450
Belgium.....	1,698	3,554,002
United States.....	1,233	2,284,044
Germany.....	858	1,972,075
France.....	332	739,152
Czechoslovakia.....	217	570,380
Switzerland.....	186	423,774
Netherlands.....	60	150,356
Poland.....	13	16,500
Rumania.....	2	4,040
	7,342	15,246,773

Conditions in Chemical Markets Overseas

British Share of Indian Imports

The following notes are abstracted from some recent Government reports issued by the Department of Overseas Trade and from other sources, and give figures of what has been achieved by British chemical exports during recent years and some useful hints on marketing methods and opportunities.

A CONTINUED growth in India's import of chemicals, after a setback in 1928-29, is recorded in a "Report on the Conditions and Prospects of British Trade in India, 1929-30," by Mr. Thomas M. Ainscough, Senior Trade Commissioner in India and Ceylon, which has just been issued by the Department of Overseas Trade (H.M. Stationery Office, 3s. 6d.). Total chemical import figures for the past five years were

	Rs. (lakhs).
1925-26	2.03
1926-27	2.44
1927-28	2.64
1928-29	2.48
1929-30	2.79

Details with regard to the provenance of the imports in 1929-30 are not yet available, but the principal details in 1928-29 are given in the Review of the Trade of India as follows:—

"The total imports of chemicals (excluding chemical manures and medicines) declined by Rs. 17 lakhs from Rs. 2.65 lakhs to Rs. 2.48 lakhs, of which soda compounds accounted for Rs. 1.13 lakhs or 46 per cent. as compared with Rs. 1.12 lakhs, or 42 per cent. in the preceding year. The United Kingdom supplied, as usual, the bulk of sodium carbonate, imports of which totalled 1,076,600 cwt., valued at Rs. 62 lakhs, as against 1,061,200 cwt., valued at Rs. 60 lakhs, in the preceding year. Caustic soda, derived chiefly from the United Kingdom and the United States, was imported to the extent of 173,600 cwt., valued at Rs. 19 lakhs, almost the same as in the preceding year. Among other soda compounds, sodium bicarbonate, sodium bichromate, borax, sodium cyanide and sodium silicate showed small increases, while sodium sulphide registered a decrease. Imports of acids during the year amounted to 22,400 cwt., valued at Rs. 8½ lakhs, and showed an increase of 6,000 cwt. in quantity and of Rs. 2 lakhs in value. Under the stimulus of lower prices sulphuric acid registered a further increase from 3,400 cwt. to 4,900 cwt. Imports of tartaric acid also increased from 1,600 cwt. to 3,000 cwt. There was a further decline in the imports of alum from 55,900 cwt. to 49,800 cwt., but aluminous sulphates recorded an increase from 64,200 cwt. to 71,200 cwt. The quantity of ammonia and salts thereof, imported, increased from 28,500 cwt. to 32,800 cwt., the value rising from Rs. 8½ lakhs to Rs. 9 lakhs. Owing to the greatly reduced demand from the Bombay mills, the imports of bleaching materials declined from 100,700 cwt. to 91,100 cwt. in quantity and from Rs. 9 lakhs to Rs. 5½ lakhs in value.

"There was a noticeable decline in the imports of sulphur, which fell off from 387,000 cwt., valued at Rs. 20 lakhs, to 301,000 cwt., valued at Rs. 16 lakhs. The supplies from Italy dropped from 305,000 cwt. to 209,500 cwt., while those from Germany rose from 71,500 cwt. to 89,100 cwt. Among other chemicals, there were noticeable decreases in the imports of calcium carbide, zinc compounds, magnesium compounds and lead compounds, while there were increases under disinfectants and potassium compounds. The quantity of glycerine imported rose from 4,400 cwt. to 5,600 cwt., but the value showed a slight decline.

Effect of I.C.I. Organisation

The following table shows the position of the principal countries during the years 1927-28 and 1928-29, the last years for which details of provenance are available:—

Principal countries of consignment.	1927-28. Rs. (lakhs).	1928-29. Rs. (lakhs).
United Kingdom	1.47	1.47
Kenya Colony	5	6
Norway	6	4
Germany	57	41
Netherlands	6	5
Belgium	4	4
Italy	18	14
Japan	3	4
United States	9	12
Total Imports (all sources)	2.14	2.48

The next table gives the percentage share of the principal countries of consignment over a period of years:—

	1913-14 (pre-war year).	1926-27.	1927-28.	1928-29.	1929-30.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
United Kingdom	74.7	57.9	55.4	59.4	57.2
Germany	12.4	21.5	21.5	16.7	15.7
United States ..	3	2.7	3.3	4.7	4.2
Italy	5.2	5.9	6.7	5.8	7.6
Kenya Colony ..	—	1.4	1.8	2.5	2.6
Norway	5	1.7	2.6	1.7	2.0
Japan	1.5	1.4	1.2	1.4	1.9
Other countries .	5.4	7.5	7.5	7.8	8.8
Total	100.0	100.0	100.0	100.0	100.0

The widespread and efficient distributing organisation of Imperial Chemical Industries (India), Ltd., is being systematically strengthened and extended, and the effect of this enterprise is likely to be seen in a steady improvement of the British position, which has already recovered by two points in the past two years. Competition from the German "I.G.," working through the Havero Trading Co., is formidable, and both groups realise the immense potentialities of the market if it is adequately developed.

Dyeing and Tanning Substances

Dyes obtained from coal tar (alizarines) were derived as follows:—

	1928-29 lb.	Rs. (lakhs).	1929-30 lb.	Rs. (lakhs).
Countries of consignment				
United Kingdom ..	1,168,137	6	1,404,684	7
Germany	3,660,039	20	3,584,571	18
Netherlands	730,644	4	212,750	1
Belgium	21,280	—	112	—
Other countries ..	105,946	1	123,298	1
Total	5,686,046	31	5,325,415	27

The slight recovery in the British position is encouraging.

Aniline dye imports were:—

	1928-29 lb.	Rs. (lakhs).	1929-30 lb.	Rs. (lakhs).
Countries of consignment				
United Kingdom ..	507,930	9	989,614	14
Germany	9,720,174	1.30	9,171,076	1.02
Netherlands	547,508	8	80,620	1
Belgium	131,489	2	54,930	1
France	121,125	3	38,062	1
Switzerland	386,754	9	706,557	19
Italy	1,020,502	15	736,309	7
United States	1,158,903	13	1,512,846	15
Other countries ...	55,950	1	30,333	—
Total imports	13,650,335	1.90	13,320,347	1.60

Although the German manufacturers have largely regained their position in the market, they are now having to meet serious competition from Switzerland, the United States and the United Kingdom. During the post-war years the British dyestuff industry has been struggling to meet the home demands. Now that the great bulk of these can be met from British works the producers are turning their serious attention to overseas markets and their progress will be watched with great interest.

Soap

The value of the imports in the valuable soap trade are now more than 60 per cent. above the pre-war average, and the trade recovered from the temporary setback of 1928-29. The household soap trade is the British stronghold, and any recovery in that trade is reflected in any improvement in our position. In toilet soaps American competition is keen, and in 1928-29 accounted for 15 per cent. of the total (United Kingdom 77 per cent., France 2½ per cent., and Germany 2 per cent.). The American productions are of high grade

and of world-wide repute. They are extensively advertised, and are actively distributed by travellers and agents. Tribute should be paid to the active selling organisation and great market experience of the leading British group, which—by sheer force coupled with the excellence of its products—maintains its position in a remarkable way.

Paints and Painters' Materials

The imports of paints and colours remain fairly stationary, and are likely to do so in view of the growing paint industry in India, which is now being developed on modern lines by some of the leading British makers. The position is as follows:—

Countries of consignment.	1928-29		1929-30	
	Cwt.	Rs. (lakhs).	Cwt.	Rs. (lakhs).
United Kingdom..	281,820	79	251,028	75
Germany	37,998	8	97,664	11
Japan.....	14,450	3	14,137	3
United States	16,301	8	19,420	9
Other countries....	91,218	14	110,452	16
Total imports .	441,853	1,12	492,701	1,14

German competition, which is becoming keener each year, is mainly in the unspecified, cheap descriptions for the lower grade bazaar trade. Imports from the United States are principally high-grade products for the European demand. The imports from Japan are almost entirely red lead.

Painters' materials comprise:—

Description.	1928-29		1929-30	
	Cwt.	Rs. (lakhs).	Cwt.	Rs. (lakhs).
Genuine Turpentine..	6,349	2	9,482	2
Turpentine substitute	2,518	1	2,971	1
Varnish	34,389	20	37,199	21
Other kinds	Not recorded.	9	Not recorded.	9
Total	—	32	—	33

Genuine turpentine is drawn equally from the United Kingdom and Sweden. The small quantities of turpentine substitute are mostly obtained from the United Kingdom and the United States. The valuable trade in varnish, which is principally used by the railway carriage shops, is divided between the United Kingdom (85 per cent.), Germany (5 per cent.) and the United States (5 per cent.). The British makers have their own branches in India and the position is strongly held.

Drugs and Medicines

The drugs and medicine trade is a very valuable one, and is showing consistent expansion. The principal items are:—

	1928-29.	1929-30.
	Rs. (lakhs).	Rs. (lakhs).
Camphor	28	32
Cod liver oil.....	1	1
Preparations of opium and morphia	1	1
Proprietary and patent medicines.	43	49
Quinine salts	24	29
Total imports of all kinds	2,02	2,26

Details with regard to the trade last year are not yet available, but in 1928-29, of the total imports of all kinds, the United Kingdom supplied 44 per cent., Germany 18 per cent., Japan 12 per cent., and the United States 9 per cent. Camphor is mainly drawn from Japan, but German imports advance steadily. Cod liver oil is 62 per cent. British and 24 per cent. Dutch. The valuable trade in proprietary and patent medicines is divided between the United Kingdom (54 per cent.), the United States (14 per cent.), Germany (12 per cent.) and France (8 per cent.). Of the quinine salts the United Kingdom contributed 61 per cent., Germany 23 per cent., and Java only 5 per cent. The Java trade has fallen off in recent years, being replaced by German imports.

India still remains without a Pure Food and Drugs Act, although the Government of India has been consulting Local Governments on the subject for some years. Reliable European suppliers are thus constantly undersold by their competitors whose drugs do not conform to the standard of the British Pharmacopoeia, and Indian consumers have drugs foisted on them which are frequently quite worthless if not positively harmful.

Chemical Trade with Syria

Advice to Exporters.

IMPORTS of the class of industrial chemicals, which includes colours and paints, into Syria during 1929 registered over 30 per cent. increase on the figures for the preceding year. These products are chiefly for industrial uses and indicate a gradual development of the industries of the country and an improvement in the standard of living.

Unfortunately, as is pointed out in a recent "Report on Economic Conditions in Syria," by Mr. R. Eldon Ellison, Acting Consul General at Beirut (H.M. Stationery Office, 1s. net), total British imports in 1929 fell for the first time to third place by values, the United States being second. When allowance is made, however, for the large imports of United States wheat owing to the bad harvest of 1928, Britain seems to be holding her position well and British goods enjoy a high reputation as regards quality.

Among drugs and chemicals British goods have rather more than held their own, France being the chief supplier and Germany a serious competitor. As regards pharmaceutical products it is unfortunate that a local firm, which has for many years sold chiefly British goods, has for the last few years been in notorious financial difficulties. There is room for considerable increase in British trade in this direction.

An interesting note is added on business methods. Few local firms can send representatives to Europe to buy, and most business is done through commission agents. These are numerous, and vary from large old-established houses to ephemeral firms with little capital and less morality. It is the ambition of every employee who can save £100 or so to go into business on his own account and call himself a commission agent.

The Question of Credit.

The question of credit is a thorny one. The standard of commercial morality in Syria is very low, and from that point of view one would like to advise that credit should only be granted in rare cases. But, on the other hand, most Syrian firms are working on a very small capital and with the best will in the world often cannot pay cash for goods. Undoubtedly British exports to Syria could be very greatly increased if British firms were more ready to grant credit; but it seems very doubtful if it would pay in the long run, especially in view of the series of bankruptcies which seems to be becoming more and more a feature of commercial life here.

In the matter of sending travelling representatives to Syria British firms are apt to be backward. The number sent seems to have increased in the last year or two, but is still far less than that sent by foreign, especially by German, firms. Beirut and Damascus are very easily visited from Greece or Egypt, and even Aleppo is not far out of the way. It should be remembered that Syria is rather a specialised market, and cannot possibly be covered from Cairo, Athens, Constantinople, or even Jerusalem. In fact, a firm expecting to do large business in Syria would be well advised to appoint separate agents in Beirut, Damascus and Aleppo (unless they definitely know that the firm chosen has branches in all three) and to send representatives periodically to visit them. Customs duty has to be deposited on travellers' samples, unless they are so defaced as to be valueless, but can be recovered on leaving the country.

A word should be said about the dilatory methods of payment adopted by many local firms. When goods are sent cash against documents many firms delay payment until it suits their convenience, and local banks often do not enforce immediate withdrawal of documents. Exporting firms might well look into this point, and, if they decide to allow such a delay—which they will probably find it necessary to do—make certain that the insurance on the goods is not allowed to lapse.

Larger Saar Output of Cokery By-Products

GENERAL advances in production figures for by-products of cokeries in the Saar region are revealed in the following comparative statistics:—

	1929	1929	First half 1930
Crude tar	122,223	49,163	59,427
Benzol products	31,240	12,617	14,960
Ammonium sulphate	27,312	11,307	12,801

Benn Brothers' Mission to Argentine

Supporting British Trade Efforts Abroad

MR. JOHN BENN, representing the Board of Directors of Benn Brothers, Ltd., will pay an official visit to the British Empire Exhibition in Buenos Aires next spring. He will sail by the Royal Mail *Alcantara* on February 26 and will be absent from this country for eight or nine weeks. He will act as editorial representative of all our journals, and, having regard to his past experience on other foreign journeys, may be expected to provide us with valuable first-hand information as to the state of affairs in this most important market. Mr. and Mrs. John Benn will participate in the official reception of the Prince of Wales, who is to open the British Empire Exhibition.

Following a Precedent

This B.B. commission is in strict accordance with precedent. Benn Brothers, Ltd., have for a full half century made a rule of supporting with their presence and with editorial space every important effort to develop British trade abroad. The early numbers of *The Cabinet Maker* show that Sir John Benn never failed to publish complete information, always secured on the spot, of the Continental Art and Furniture Exhibitions which were a feature of those days. Later Sir John visited the United States of America and laid the foundations of our connections over there. In 1911 Sir John paid a prolonged visit to the Argentine and to Chile, and was the guest of the Argentine Government at the celebration of the centenary of the republic.

Sir Ernest Benn was for many years closely associated with the old Exhibitions Branch of the Board of Trade and took an active part in the British section of the exhibitions at Brussels, Milan, Antwerp and Ghent. At the last mentioned he was responsible for the collecting and arranging of the Library of English Technical Literature, which was specially housed in an exhibition hall designed by Mr. Frank Brangwyn. In 1921 and again in 1926, Sir Ernest journeyed to Canada and the United States on behalf of the B.B. journals. In 1929 he made a tour of Scandinavia and the Baltic States and was entertained by many Chambers of Commerce and leading trade organisations in his capacity as a technical publisher. Perhaps the most important of Sir Ernest's work in connection with foreign trade was his several trips to Central Europe immediately after the war and the establishment by him in 1921 of *The European Commercial*, a weekly published in English in Vienna which, until the financial situation in Central Europe brought it to an end, did a great deal, under the editorship of Mr. T. Mortimore Sparks, to re-establish English links with the Continent broken during the war.

Establishing Personal Touch

The record of the firm's efforts to establish personal touch with overseas markets is a very long one. Mr. Edwin Haynes, as Managing Editor of *The Timber Trades Journal*, made several official trips to Canada and to the Baltic. Mr. F. E. Hamer, in his capacity as Editor of *THE CHEMICAL AGE*, was in 1928 the guest of the Chemical Societies of America, and in his wider capacity as representative of Benn Brothers, Ltd., took a leading part in the American Business Papers Convention of 1922. Mr. E. G. Benn is among the other members of the firm who have crossed the Atlantic as our representative.

Mr. John, the firm's commissioner for the present purpose, has a good deal of experience of trade paper work abroad. In 1922 he was resident for a year in the United States. In 1925 he was our delegate at the Cologne Fair, and in 1926 he made an extended tour to the South of France and Spain with members of the National Fruit Trades Federation.

It is altogether appropriate that Benn Brothers, Ltd., should once again turn their attention to the Argentine, for in 1910 we were actually publishing in Buenos Aires. *El Comerciante Argentino* was an attempt to publish a journal on behalf of British trade not only in the language of a foreign market, but actually produced there. For four years until the war *El Comerciante Argentino* appeared monthly from our offices in Buenos Aires. Whether or not the report which Mr. John will bring home will indicate the possibilities of a restarting of this interesting enterprise remains to be seen. Another of the firm's publications, *The British Trade Journal and Export World* issues an *Edicion Espanola*, which is about to enter its fiftieth year of publication.

Need for Fertilisers in Portugal

Centre of Keen Competition

THE need for fertilisers in Portugal is stressed in the "Report on Economic Conditions in Portugal," by Mr. A. H. W. King, British Commercial Secretary at Lisbon, issued by the Department of Overseas Trade (H.M. Stationery Office, 2s. net). Owing to primitive methods of cultivation, especially in the south, and to soil exhaustion, yields are very low. Live stock is scanty and of poor quality. The soil is especially deficient in nitrogen and inorganic matter and would respond to the use of nitrogenous and potassic fertilisers. Hitherto only superphosphate has been used in quantity. Insect and fungoid pests are rife, and there should be a good market for insecticides.

As compared with her pre-war position, Great Britain has lost ground only slightly. The high Portuguese tariff applies equally to all, but its height is more easily surmounted by those European nations who enjoy the advantage of lower costs of production than United Kingdom manufacturers. The standard of British commercial morality is esteemed in Portugal no less than the quality of British manufactures, but, while appreciating the one, the Portuguese cannot afford to pay for the other. The major problem of costs can only be solved in the United Kingdom. Nevertheless, in spite of difficulties at home, more should be done by British manufacturers in the way of investigating market conditions on the spot. Competition in Portugal is extremely keen and the actual and potential demand and the nature of competition cannot be accurately gauged without a personal visit. Even if business does not result it may be considered that the expenditure involved is worth the knowledge that has been acquired as to the activities of our commercial competitors abroad. It may be added that, in spite of all that has been said on the subject, the bulk of the trade literature and catalogues arriving in England. This is valueless.

Marketing in Newfoundland

The Study of Local Conditions

IN some notes on market conditions in Newfoundland by H.M. Trade Commissioner in Toronto, it is stated that the desire of the people of the island, and particularly of the merchants of St. John's, is to do business with the United Kingdom. In the years immediately after the war, when sterling was at a discount, the Customs requirement that duties should be computed at the par rate of exchange tended to the development of business with United States firms.

The increase in the variety of British goods now available is quite remarkable, and the principal houses once again send their buyers regularly to the United Kingdom. The fact that many of the leading men send their sons and daughters to school "at home" not only indicates the strength of the sentiment that binds Newfoundland to the Mother country, but furnishes a ready-made preference for British goods.

Nevertheless, there are some points that must be borne in mind by manufacturers desiring to develop their trade. In the first place, the population of the island is only a quarter of a million. Some 41,000 odd live in St. John's—57,000 in greater St. John's; the balance is scattered in outports throughout the island, living for the most part in somewhat primitive conditions.

Manufacturers must also remember that Newfoundland is not a part of Canada, and that their representation in Newfoundland should not, as a general rule, be given to agents resident in Canada. The distance from Montreal to St. John's is almost as great as from Liverpool to St. John's, and the cost of travel is very high. Agents in Canada have more than enough to do in their own territory if they are to cover it adequately. The majority of them cannot afford the time or the money to go to Newfoundland. It must further be borne in mind that Newfoundlanders strongly resent being compelled to conduct their business with British firms through agents in Canada. Their sensitiveness on this point frequently exceeds their desire to trade with the United Kingdom and a number of cases might be cited in which they have placed orders in the United States because they have been referred by British manufacturers, to whom they wrote direct, to agents in Montreal or Toronto.

Trade Publications

Special Waxes

A booklet dealing with special waxes (Rilan and Lanette) has been published by the Deutsche Hydrierwerke A.-G. Rodleben Germany, and is being distributed by Ronsheim and Moore, 11, Wormwood Street, London, the sole concessionaires of the manufacturers for Great Britain and the Dominions. Rilan wax is the registered name of a new synthetic product which has a lighter colour than the lightest type of Carnauba wax and an unusual degree of hardness, resulting in very bright effects. Lanette wax is a mixture of palmityl and stearyl alcohols and is a starting point for the preparation of many synthetic compounds and derivatives. It is insoluble in water, but possesses the property of forming homogeneous compound mixtures which are easily emulsifiable in water, in combination with ordinary soap or soap substitutes, Turkey red oils and allied materials.

Acticarbhone

The history, manufacturing processes and industrial application of the well-known activated carbons "Acticarbhone" are set out in a brochure of the Société de Recherches et d'Exploitations Pétrolifères of Paris. The primary use of Acticarbhone was for the extraction of petrol from natural gas, but among the many industrial uses for which it now finds highly successful application are the extraction of benzol from coal gas, recovery of volatile solvents, gas and air purification, as a catalyst, and also in refrigerating machines and gas masks. For the purification and decolorisation of solutions Acticarbhone is generally in the form of a powder or paste, and can be regenerated after each operation. The two chief methods of application are the mixing and layer filtration processes. These charcoals are not only good decolorisers, but excellent filtering and clarifying media, and have no trace of acid or other injurious substances. The agents for Great Britain are Price, Stutfield and Co., Ltd., 6, Fenchurch Buildings, London.

Industrial Crystallisation

"The Practice of Industrial Crystallisation," by Dr. W. L. McCabe, forms the tenth and final article in the series on "Heat Transfer and Crystallisation," issued by the Swenson Evaporator Co., Harvey, Illinois, U.S.A. The more important types of crystallisation apparatus are classified under the headings of batch or discontinuous apparatus (with or without stirring), continuous apparatus (Swenson-Walker and Wulff-Bock), and vacuum crystallisers, and there is a section on caking of crystals and its prevention. It is pointed out that commercial apparatus for crystallisation should be examined from the points of view of the size and uniformity of the product, as well as of capacity and purity.

Resins and Solvents

An ingenious and informative catalogue has just been issued by the Neville Chemical Co. of Pittsburg, U.S.A., under the title of the "Neville Chemical Handbook" dealing with the resins, solvents and coal by-products manufactured by the firm. Besides general data on the classification, solubility and industrial application of resins, there is a complete section on their use in the varnish industry, in place of more expensive gums. Several pages are devoted to the preparation of driers. The standard coumarone resin of the Neville Co. consists only of light coloured resin. Variation of colour has been eliminated and it is graded by melting point alone. Dark resin, of any melting point up to 135° C., can also be supplied to customers who specify it. Nevindene is a new product offered to the varnish industry as a harder and higher melting resin than coumarone. In the solvents section there is a useful table, giving the time for complete evaporation of the principal commercial solvents under identical conditions. The booklet is fitted with Snapper rings for the insertion of additional leaves as they are issued.

Hilger Publications

A treatise on "Biological Applications of Absorption Spectrophotometry" has been published by Adam Hilger, Ltd., 24, Rochester Place, Camden Road, London. Absorption spectrophotometry is a well established laboratory method which has proved of great value in the dyeing and other industries and of recent years considerable work has been done in establishing its use in biology.

Other recent Hilger publications include a reissue of their catalogue of apparatus for testing petroleum and its products, and a leaflet dealing with the "Munsell Book of Colour."

The Visco Engineering Co., Ltd., 162, Grosvenor Road, London, have issued a booklet describing their industrial vacuum cleaners.

Recent publications by Crompton Parkinson, Ltd., Guiseley, Leeds, deal with their air break switchgear, kiosk type substations and electric lamps.

An ingenious and economical "Springless" tub axle greaser has been put on the market by Hadfields, Ltd., Hecla Works, Sheffield, and is described in their latest leaflet.

Methods of estimating boiler evaporation and some notes on the potential dangers of scale are contained in Technical Publication No. 26 of the Feed Water Specialists Co.

A reduction in price, following of a new pattern, is announced in a leaflet of Alexander Wright and Co., Ltd., 1, Westminster Palace Gardens, London, dealing with the Simmance patent dead-beat vacuum and pressure recorders.

Publications, just issued by Crossley Brothers, Ltd., Openshaw, Manchester, deal with their vertical compressorless Diesel engines (1240B), enclosed horizontal oil engines (1313A), and two large installations at works in Yorkshire and Scotland.

Sternol adhesive belting bricks for leather transmission belts and Balagrip for Balata belts are the subject of a leaflet issued by Sternol, Ltd., Royal London House, Finsbury Square, London, who are offering sample cases of the two bricks on approval.

Recent Research on Timber

Report of the Forest Research Board

THE second serial report of the Forest Products Research Board for the period October 1, 1928 to December 31, 1929, has just been issued (H.M. Stationery Office, 4s. net). The Laboratory was established at Princes Risborough in the summer of 1927, and the first report, which provided a full explanation of the organisation and aims of the work, dealt with a period when the progress of the work was limited by the time necessarily spent in arranging routine, training staff, and like matters. The present report deals with the second stage of the Laboratory's existence when, with these preliminaries completed, it has been possible to concentrate wholly on the programme of research. A marked increase in the scope and development of the work is recorded. This increase is shown by the fact that, including special parties from professional and trade organisations, the visitors to the Laboratory during 1929 numbered 574 persons.

Main Investigations

The main investigations, the progress of which is described, are: Variation in wood structure with respect to variation in properties; anatomical structure of home-grown timber; kiln and air-seasoning; seasoning and preservation of larch telegraph poles; shrinkage; moisture content of furniture woods; effect of kiln-seasoning on strength of timber; strength of home grown timbers; tests of timber in structural sizes; revision of existing specifications for building timbers; tests of pit-props; deterioration in strength of timber at various stages of decay; preservation of timber; dry rot and wood-destroying beetles; chemistry of wood and charcoal-making in portable kilns.

The laboratory work on dry rot and the Death-Watch beetle has been brought to the point where large scale investigations are to be made in a special building shortly to be erected for the purpose. This building is so designed as to permit not only the study of the conditions of existence of these organisms, but the effect of different methods of construction in aiding or preventing attack, and the efficacy of preservatives.

The report also describes an important expansion of the functions of the Board, under arrangements made by the Empire Marketing Board with the Department of Scientific and Industrial Research, to allow the Laboratory to undertake the testing of Empire timbers, and shows the classes of work that it will be possible to carry out.

The Reactivity of Coke

Methods of Measurement and Control

A LECTURE entitled "Observations on the Reactivity of Cokes" was delivered at the Sir John Cass Technical Institute, London, on Monday, by Professor J. W. Cobb, C.B.S., B.Sc., F.I.C., Livesey Professor of Coal Gas and Fuel Industries in the University of Leeds. The carbonisation of coal, he said, was for many years carried out practically as a one-product industry for the manufacture of gas in the gasworks or of coke in coke oven plants. Conditions have so far changed that when carbonisation is now undertaken it is sought to realise as fully as possible the technical and commercial value of all the products—solid, liquid and gaseous.

As regards the solid product, coke, the widest possible field for its utilisation is sought, with every prospect of success, because of the growing determination to abolish the smoke nuisance. The best results can, however, only be obtained from coke and the maximum replacement of coal if it combines with its advantages as a smokeless fuel the good properties of coal. Considering, for instance, domestic use, coke has a high radiant efficiency in a fire, considerably higher than coal, but the ash is necessarily higher than that of the coal from which it is produced. The minimising of ash and moisture in coke is plainly called for. Then, again, it does not ignite so easily as coal locally, nor does the ignition spread so quickly through the mass. It should be sought to make its rate of reaction with gases such as oxygen, carbon dioxide and steam as high as possible for many purposes, although a low reactivity may at times be not only desirable but essential.

Rate of Reaction

The reactivity is a definite property of the coke and should be as far as possible made controllable and determinable. Behaviour as regards ignition is determined very largely by the presence in the mass of specially ignitable ingredients, perhaps in quite small proportion, but reactivity is an average property of the mass, although when coke is being gasified it is the condition and extent of the surface which determines the reactivity at any one time. The rate of reaction to different gases comes in question. As regards oxygen, only at low temperatures is the reactivity of one coke as compared with another of importance, because the reactivity soon becomes so great that the rate of combination is only limited by the rate at which oxygen can be supplied to the surface of the fuel.

Reactivity to carbon dioxide is important with gas producers and affects the behaviour of a domestic fire, and that to steam must plainly affect the working of water gas plant. The actual rate of gasification must depend upon the quality of the surface exposed to the gas stream and also the extent of that surface. The quality of the surface, as independent of its extent, may be examined for a coke or other form of carbon by the determination of the equilibrium value in the reaction $\text{CO}_2 + \text{C} = \text{CO}$, but it must be remembered that the value obtained alters with time until the surface is graphitised. The extent of surface can be measured by such methods as those applied by Rideal, depending upon the determination of the amount of methylene blue adsorbed from a solution to form a unimolecular layer on the coke. The total surface is so determined, allowing, say, 48 hours for adsorption, but this is not necessarily the effective surface when a stream of gas passes with some velocity over the coke surface. For this and other reasons, reactivity should be determined under conditions approximating as nearly as possible to those under which the fuel is to be used.

The usual laboratory method is to heat a column of graded coke in a stream of gas, say CO_2 , determining the reduction of CO_2 under specific conditions. Preliminary heating is necessary to expel adsorbed and residual gases, but if this is carried too far it may alter the quality of the surface by a carbon transformation. For this reason determinations of a low temperature coke have been made at low temperatures, such as 500 or 600° in oxygen in a special apparatus. In all tests it must be remembered that there is a liability to preferential gasification of reactive carbon in the first stages, and that transformation of carbon may occur during the carrying out of the test. The rate of this transformation, which occurs most rapidly on the surface, should not outstrip that of the gasification. The reactivity may be expressed simply as a

percentage reduction of CO_2 under specified conditions. But a less arbitrary method has been devised, according to which the inverse weight of a column of coke which will give a standard gas decomposition is made the measure of its reactivity, a curve connecting reactivity and percentage decomposition having been previously experimentally determined. In this way small additions of lime and soda have been shown to increase the reactivity to CO_2 eight or twenty times respectively. In these cases increase in surface is certainly not the principal cause of the increased reactivity.

An Old Theory of Light Fading

Address to Manchester Dyers and Colourists

At a meeting of the Manchester Section of the Society of Dyers and Colourists held on Friday, October 17, the Chairman, Mr. F. Scholefield, M.Sc., F.I.C., read a paper entitled "An Old Theory of Light Fading."

Mr. Scholefield referred to Christian Johann Dietrich Freiherr von Grothuss, who was born in Leipzig in 1785, and who early showed a bent for natural science; for example, preparing his own pigments for painting from vegetable and mineral substances and also exhibiting a special interest in chemistry, although a tutor who could not distinguish between chemistry and alchemy forbade him to undertake the study of it.

After much study and experimentation, Grothuss came to the conclusion that every single ray of light must be regarded as a voltaic pile of linear form, without the inclusion of a conductor of the second class. This conclusion, however, did not apply to the spectrum. The extraordinary advances made during the last quarter of a century in regard to the chemistry and physics of the atom had naturally led to the putting forward of many theories of light action which involved the ultimate structure of the atom as a system of electrons. One such theory practically restated Grothuss's electrolytic theory of light action in terms of modern science, and fortified it with much experimental evidence and theoretical reasoning.

When a molecule absorbed light, its energy content was increased, and the molecule was said to become "activated." By some it was held that this process of activation was dependent upon the transfer of an electron from a lower to a higher orbit. With the return of the electron to its normal orbit, energy was liberated either in the form of heat, fluorescence, or chemical action. There were a large number of chemical actions which took place at an observable speed under the influence of light only in the presence of so-called sensibilizers which might either be dyestuffs or certain metallic salts or other substances; for example, uranyl salts. These salts, on illumination, behaved as though they contained a higher and a lower state of the uranium, and, accordingly, the illuminated uranyl solution had both oxidising and reducing properties.

Photo-Chemical Sensibilisation.

If a sensibilizing dyestuff was substituted for the uranyl salt, an explanation of photo-chemical sensibilisation was afforded. When light energy was absorbed, a molecule of the dyestuff lost an electron to another molecule, the former then becoming positively and the latter negatively charged; or one portion of the molecule might lose an electron to another portion, an electrical polarisation being thus set up. Since the positive pole possessed the properties of an anode, and the negative those of a cathode, the molecule had both oxidising and reducing properties. Thus, when a solution of mercuric chloride and ammonium oxalate containing eosin was exposed to light, the mercuric chloride was reduced to mercurous chloride, and the oxalate was oxidised to carbon dioxide. In such a case, the oxalic acid acted as an anodic depolariser, and the mercuric chloride as cathodic depolariser. A large number of reducible bodies could be used as cathodic depolarisers such as silver, mercury and copper salts, reducible dyestuffs, etc., and as anodic depolarisers such oxidisable substances as glycerin, glucose, cellulose, etc., might be employed.

The energy absorbed by the system would depend upon the frequency of the light absorbed. Baur calculated that the yellow sodium line 589μ gave a theoretical potential difference of 2.4 volts, while the fluorescent mercury line 2536μ gave a figure of 5.5 volts.

Low Temperature Carbonisation

Deputation to Minister

MR. E. SHINWELL, Minister for Mines, received a deputation from the Low Temperature Coal Distillers' Association of Great Britain, on Wednesday. He said that it afforded considerable satisfaction to see the Low Temperature firms forming themselves into an association and working together. The Ministry of Mines were extremely sympathetic to the whole programme in connection with the development of low temperature carbonisation, and would give energetic attention to all those matters in which they could be of assistance.

Two outstanding features which were always present in his mind were, firstly, the enormous importance of developing the home production of oil; and, secondly, the great disadvantages attending the burning of coal in its raw state. Any proposition that had for its object the encouragement of the first and the discouragement of the second would receive their energetic support.

The deputation included: Col. Bristow (managing director of various Coalite companies and Petroleum Refineries, Ltd.), Lt.-Col. Moore-Brabazon (L and N Coal Distillation, Ltd.), Sir Samuel Instone (Doncaster Coalite, Ltd.), Mr. Robert Maclaurin (Maclaurin Coal Products, Ltd.), Mr. J. E. Truzaell (Midland Coal Products, Ltd.), Mr. H. P. Hird (British Carbonised Fuels, Ltd.), Lt.-Commander Colin Buist (Petroleum Refineries, Ltd., and hon. secretary to the association).

Motor Fuel Proprietary, Ltd. Circular

The directors of the Motor Fuel Proprietary, Ltd., have now sent out to the shareholders the circular promised at the annual meeting in February. The performance of the new "continuous" plant at Slough is stated to be satisfactory and is demonstrating an actual commercial application of the company's process of low temperature carbonisation.

"As an example of the extremely high efficiency now being obtained with the new plant," the circular says, "the results from the treatment of Nottingham coal recently carried out are given below:—

Volatile content of raw coal	= 39.16%
Ultimate possible oil yield ascertained by laboratory low temperature assay	= 41.2*
Actual oil yield by bulk treatment in plant	= 36.8*
Efficiency	= 89.09%

*Gallons per ton.

"There was simultaneously produced 12.24 cwt. of smokeless coal per ton of coal treated. With a well-known South Wales coal the yields per ton of raw coal have been 26.6 gallons of oil; 13.8 cwt. smokeless coal.

"The directors are making every endeavour to establish the company on a commercial basis, but owing to the present serious depression in trade and the difficulty in securing finance for the erection of plants, it is difficult to at once take advantage of the successful results obtained by the process."

The directors had been desirous of securing the assistance of someone with a thorough knowledge of engineering, and, if possible, one who had made a study of the low temperature carbonisation of coal, and Mr. J. Hughes Rice, of Swansea, South Wales, has therefore been approached and has consented to join the Board.

Production of Iodine in Russia

THE Soviet authorities are building iodine factories in the Far East and the Northern district, and this year it is proposed to produce 11,000 kilograms of iodine from seaweeds. Near Archangel a new method has been devised for obtaining iodine from seaweeds, with a cost to the producer of not more than 10 roubles a kilogram of iodine. A group of scientific workers from the Academy of Science claims to have discovered new, inexhaustible supplies of iodine-bearing substances. Near Archangel and in the Far East, subterranean waters have been found containing up to 50 milligrams of iodine per litre of water. The iodine obtained from this water costs less than that produced from seaweeds, and, owing to the new method of production, the output in 1930-1931 will amount to 115 tons. In addition to iodine, various salts, potash, spirits, and other chemicals are produced from seaweeds.

"Science Discipline"

Alexander Pedler Lecture at Liverpool

LT.-COL. SIR DAVID PRAIN, C.M.G., C.I.E., F.R.S., delivered the second annual Alexander Pedler Lecture (founded by the British Science Guild in memory of Sir Alexander Pedler, F.R.S.) on Wednesday, in the University of Liverpool, under the joint auspices of the Guild and the University. The subject of the lecture was "Science Discipline."

Huxley, he said, held that in an ideal University a man should be able to obtain instruction in all forms of knowledge, and discipline in the use of all methods by which knowledge might be obtained. For him there were three forms of knowledge: the limits of one's individual powers, the uses to which these powers may be put and the conditions under which these powers can be used. These forms of knowledge were the same for literature as for science, for science and literature were but two sides of the same shield. Science, however, no longer connoted all knowledge, but meant more particularly "natural knowledge." Science discipline, therefore, implied cultural exercise of every method by which natural knowledge could be obtained, as contrasted with science training, which implied technical exercise in any method by which natural knowledge might be employed.

The sole object of science training was to make an adequate number of scholars, already disciplined in the requisite natural knowledge, competent to give the general community effective scientific help, and confusion should be impossible between training and discipline in this sense. The purpose of discipline was two-fold: on the one hand to furnish those who wished to serve the community scientifically with the kind of natural knowledge that would enable them to profit by training for technical efficiency; and on the other hand, to render all scholars in any ideal University competent to appreciate the scientific help afforded the community by those specially trained to give it. This second object was not less important than the first. And, while the first of these ends had now been largely attained, perhaps in due course the need for securing the second might come to be appreciated by those responsible for the organisation of science discipline.

Sulphate of Ammonia

Prices for 1931-32 Season

IMPERIAL Chemical Industries, Ltd., have issued the following list of prices of sulphate of ammonia for home agricultural use. For delivery in:—

					£	s.	d.
1930—October	..	..	..	..	9	1	0
—November	..	..	..	..	9	3	0
—December	..	..	..	..	9	5	0
1931—January	..	..	..	..	9	8	0
—February/June	..	..	..	..	9	10	0

per ton for neutral quality guaranteed to contain 20.60 per cent. of nitrogen by weight and not to contain more than 0.025 per cent. of free acid (H_2SO_4), delivered to consumer's nearest station or wharf in Great Britain for prompt cash payment in lots of 6 tons and upwards, packed in single bags containing about 2 cwt. net.

For any delivery described by the sellers as of neutral quality which shall not be up to standard the following allowances is made:—

(1) 9d. per ton if the content of nitrogen is under 20.60 per cent., but not under 20.50 per cent., and so on at the rate of 9d. per ton for each 0.10 per cent. or fraction of nitrogen, below 20.50 per cent. (2) 2s. 6d. per ton if the content of free acid is over 0.025 per cent. but not over 0.05 per cent.; a further 2s. 6d. per ton if the content of free acid is over 0.05 per cent., making a total of 5s. per ton as the maximum allowance for excess free acid. (3) 4s. 6d. per ton if the sulphate of ammonia is not in readily friable conditions at the time of delivery.

For each separate delivery of less than 6 tons, by rail or water, the following extra charge will be made, even if the total quantity purchased is greater than 6 tons:—

4 tons and over, but less than 6 tons, 1s. per ton over 6 ton price			
2 tons	..	4 tons, 5s.	..
1 ton	..	2 tons, 10s.	..
2 cwt.	..	1 ton, 1s. per cwt.	..

From Week to Week

EMPLOYEES of Imperial Chemical Industries, St. Rollox, Glasgow, have contributed £77 to charities during the year.

ONE HUNDRED POUNDS OF CHLORINE are to be used every 24 hours for chlorinating the water supply of the city of Guadalajara, Mexico, on account of numerous cases of typhoid among the inhabitants.

DR. L. A. JORDAN, director of the Research Association of British Paint, Colour and Varnish Manufacturers, gave a lecture last week on the researches now in progress to the Paint and Oil Section of Glasgow Chamber of Commerce.

THE VANCOUVER CREOSOTING CO., LTD., of North Vancouver, B.C., is stated to be increasing the capacity of its plant by 50 per cent. by the addition of a treating cylinder unit, two creosote oil storage tanks to provide a storage capacity of 2,000,000 gallons, and large piling and wharf construction.

THE DEPARTMENT OF OVERSEAS TRADE announces that Mr. H. A. N. Bluett, the British Commercial Agent at Batavia, will be available at the offices of the Department, 35, Old Queen Street, London, from November 3 to November 21, for the purpose of interviewing firms interested in the export of British goods to the Netherlands East Indies.

THE FIRST CONSIGNMENT to the United Kingdom of bulk nitrate has just arrived at Liverpool in the Gulf Line steamer *Pear Branch*. Hitherto nitrate has arrived in this country in bags, but with the new method of production devised by the Chilean Nitrate Producers' Association it is possible to cheapen the cost of transit by bulk cargoes. It is stated that this new nitrate has special advantages over the ordinary nitrate, and that it has proved to be particularly beneficial to soil.

THAT THE TEXTILE DYEING industry in the Vale of Leven has been killed by the high taxation is the contention made by the ratepayers in the district, who are organising a protest and are to ask the County Council to repudiate their decision to proceed with a sewage scheme which will mean an addition in the rates of 2s. 1½d. in the pound. Dyeing firms in the area state that they are unable to compete with dyeing firms in the cotton area, as industry and the people who depend on it are being driven from the district by the excessive taxation.

THE GERMAN POTASH SYNDICATE's sales during the second quarter of 1930 were about 35,000 tons smaller than in the corresponding quarter of 1929, due principally, it is said, to smaller exports, but for the half-year the sales about equal those of 1929. The general situation in the potash industry is considered satisfactory, and a number of potash concerns have increased their dividends. The campaign to stimulate the demand for potash by increasing the proportion of potash used in mixed fertilisers is reported by the U.S. Consul at Leipzig to be now well under way.

THE BOARD of directors of the Chilean Nitrate Co. (Cosach) has been announced as follows: Representing the Government: Señors Pablo Ramirez, Rodolfo Jaramillo, Ricardo Salas and Ricardo Ayala. Representing the industry: Alfred Houston, Carlos Castro, Maximo Grizar, Jorge Vidal, Jose Rios, Enrique Valenzuela, Moises Astoreca and Josquin Yrarazaval. Thirty companies, representing 94 per cent. of the Chilean nitrate industry, are stated to have joined the undertaking, including the Anglo-Chilean Consolidated Nitrate Corporation (American) the Lautaro Nitrate Co., Ltd. (British concern) and the Sabioncello group of companies.

A FINNISH company, the first of its kind there, has been founded, under the name of "The Insulite Company of Finland," for manufacturing insulite for export to European countries. The waste from Finnish woodworking industries is to be used as raw material, and the mill, which is being built near Karhula, will have an annual output of 60,000 tons. At the moment only one unit is to be installed, for a production of 30,000 tons, but it is intended to complete the building of the mill in the course of the year. The capital of the company, 24 million marks, is to be provided at first by the American participant, the Backus-Brooks Co., but the Finnish firm A. Ahlstrom Oylas has the option to become a partner within a given time.

EDMUND HORSFALL, one of the victims of the explosion of an ammonia cylinder at the Stockport Corporation Society's premises, reported in our last issue, has since died from his injuries.

RECENT WILLS INCLUDE Mr. Alexander MacDonald, of Highgate, London, late of J. F. Macfarlan and Co., manufacturing chemists, Edinburgh and London (net personalty £25,000), £25,542.

THE ENGAGEMENT is announced of Sir Richard Gregory, Emeritus Professor of Astronomy, of Queen's College, London, and editor of *Nature*, and Dorothy Mary Page, daughter of Mr. and Mrs. William Page, of Ashmere Croft, Middleton, near Bognor Regis. Sir Richard lost his first wife in 1926.

A FIRE broke out on Friday, October 17, at 37, Park Road, Battersea, London, the premises of Smith Hughes and Co., Ltd., chemical merchants, and did considerable damage to the first floor of the building and its contents. The upper floors were damaged by heat and smoke and the contents underneath by water.

A BIG BRITISH WHALING CATCH was announced in wireless reports received from the Antarctic on Tuesday, stating that a catch producing 11,000 barrels of oil, valued at over £45,300, has been made by the Anglo-Norwegian Holdings fleet, the largest British Empire unit in the whaling industry, for the first week of the 1930-31 season, ended October 19.

AN INTERNATIONAL CONFERENCE of zinc producers was held in Paris on Tuesday to discuss the terms on which the proposed international cartel shall operate. The British Metal Corporation was represented by Mr. Lyttelton, the Electrolytic Zinc Corporation of Australia by Mr. Robinson, Canadian interests by Mr. Gardner, and American-Mexican interests by Mr. Baer. A further meeting will be held in November.

THE APPEAL OF THE defendants in the Lever Bros. action against Mr. E. H. Bell and Mr. W. E. Snelling, formerly chairman and vice-chairman of the Niger Co., has been heard for several days in the Appeal Court this week, and again adjourned. The defendants are appealing against the judgment of Mr. Justice Wright ordering them to repay £30,000 and £20,000 which they received respectively as compensation for loss of office.

THE EMPIRE MARKETING BOARD has approved a grant to the Dairy Research Institute at Palmerston North, New Zealand, for a special investigation into conditions affecting the quality of cheese. Experiments on the condition known as "openness" in cheese have shown that investigation must go deeper into the processes of cheese manufacturing before the cause of it can be found. Special research into the chemistry and bacteriology of cheese-making will therefore be carried out.

PROFESSOR J. B. LEATHES, in the course of the Harveian Oration, which he delivered at the Royal College of Surgeons, London, on Saturday last, said the 10 years after the death of Harvey formed a remarkable epoch in the history of physiology. Biological chemistry came to birth in some papers published by John Mayow, who died at the age of 39 and was forgotten for a hundred years after his death. If it had not been for the experiments and writings of Mayow, the discovery of oxygen would not have been made good, nor the doctrine made clear that all the activities of animals involved the oxidation of organic substances conveyed by the blood. Mayow's discoveries rediscovered were the starting point of modern chemistry.

Obituary

MR. B. J. E. SHERWIN, of Trentham, head ceramic chemist at the Blythe Colour Works, Ltd., Creswell.

PROFESSOR FRANCIS WALD, the well-known chemist and philosopher, and author of about fifty works, chiefly on metallurgy, aged 70.

MR. JOHN A. THOMPSON, governing director of Messrs. Thompson Bros. (Bilston), Ltd., Bradley Engineering Works, Bilston, Staffs, on October 15.

MAJOR SIR RICHARD WHIELDON BARNETT, vice-president of the Institution of Petroleum Technologists, and chairman of the British Controlled Oilfields, Ltd., Baku Consolidated Oilfields, Ltd., on October 17, aged 67.

Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.

Abstracts of Accepted Specifications

333,872. POLYMERISING DIOLEFINES. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. Application date, March 15, 1929.

Diolefines are polymerised in the presence of alkali or alkaline earth metals dispersed in solvents or dispersion media, *e.g.*, by comminuting the metals in the liquids whilst stirring or shaking, and heating, or by atomising the fused metal into the liquid. The dispersion medium may be a hydrocarbon such as benzene, toluene, xylene, tetrahydronaphthalene, decahydronaphthalene, hexahydrobenzene, paraffins, or the liquid polymerisation product of this process. The diolefine is supplied as vapour or liquid, and may be continuously supplied and the product continuously withdrawn. The solvent may be distilled off during or after the process. In an example, butadiene vapour is passed into a dispersion of sodium in decahydronaphthalene, which is made at 140° C. and used at 60°–100° C. When absorption ceases alcohol is added to remove the sodium, and the mixture treated with steam to obtain a sticky white mass which is dried in vacuo to a transparent viscous liquid soluble in benzene, amyl acetate, pyridine, etc. In another example, butadiene is passed into a dispersion of potassium and sodium in xylene, and the product treated as above.

333,882. DYES. I.G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. Application date, May 13, 1929. Addition to 307,026.

Dibenzpyrene-quinones are nitrated under milder conditions than those in Specification No. 307,926 (See THE CHEMICAL AGE, Vol. XX, p. 507), *e.g.*, at a lower temperature, or for a shorter time, or with a smaller proportion of nitrating agent. Mono-nitro derivatives are obtained and may be reduced to the corresponding mono-amino derivatives. In an example, 4:5:8:9-dibenz-pyrene-3:10-quinone is treated with a mixture of nitric acid and nitro-benzene in a ball mill at ordinary temperature, or if the calculated quantity of nitric acid is used, at a raised temperature. The mononitro derivative may be reduced to the mono-amino derivative.

333,894. SYNTHETIC RUBBER. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. Application date, May 16, 1929.

Diolefines are polymerised in the presence of hydrozine or its derivatives, with or without solvents or dispersing agents such as water, alcohol, or benzene, and oxidising agents such as hydrogen peroxide or its compounds with organic substances such as betaine, urea or sodium acetate, inorganic compounds such as perborates and percarbonates, and the compound of potassium fluoride with hydrogen peroxide, and barium or sodium peroxide. Air or oxygen, ozonides and enzymes may be employed. Emulsifying agents used include sulphonic acids and their salts, and when they contain a nucleus alkyl radicals may be attached, also soaps, oleates, saponified oxidised paraffins, sulphite cellulose waste liquor, gum arabic, dextrine, starch, etc. Aliphatic, aromatic, hydroaromatic, or heterocyclic hydrazine derivatives may be used, particularly hydrazo-isobutyric acid, and acid hydrazides. In an example, butadiene is treated with a solution of hydrogen peroxide and hydrazo-iso-butyric acid, hydrazine dicarboxylic acid ethyl ester, or sodium phthalyl hydrazide at 70° C. in the presence of alcohol or water. Other examples are given.

333,901. RUBBER SUBSTITUTES. E. W. Hultman, 916, N. Wilton Place, Los Angeles, U.S.A. Application date, February 18, 1929.

The process is for the preparation of a rubber-like substance by the polymerisation of mineral oils free from constituents boiling below 205° C. The oil is polymerised at 90°–95° C. with a catalyst of cerium or tin oxide, cooled, treated with a hot reducing gas which has been activated by passing over nickel or palladium at 205° C. then halogenated with chlorine, bromine or boron fluoride, and allowed to stand for some days. The rubber-like substance is separated from the oily material and any sulphur present may be employed in the subsequent vulcanisation. A detailed example is given of a Pacific coast crude oil.

333,902. CELLULOSE ETHERS. Imperial Chemical Industries Ltd., Millbank, London, and D. Traill, Cronulla, Ardrossan Road, Saltcoats, Ayrshire. Application date, February 20, 1929.

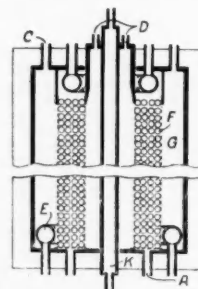
Aralkyl ethers of cellulose, particularly benzyl cellulose, which are insoluble in organic solvents such as benzene, toluene, or xylene mixed with industrial spirits, may have their solubility improved by treating with benzyl chloride or other aralkyl halide and water and steam at increased pressure. The benzyl cellulose may be separated from the benzylation mixture, or the reaction mixture containing benzyl chloride may be treated. The benzyl chloride is hydrolysed during the treatment, which thus purifies the crude benzyl cellulose. The modified aralkyl celluloses give clear lacquers and can be used in preparation of moulding powders, safety glass, artificial silk, celluloid, plastic wood, etc. Some examples are given.

333,904. RECOVERING FATTY ACIDS. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. Application date, March 14, 1929.

The crude oxidation products obtained by the destructive oxidation of paraffin, montan, or beeswax, are treated with sufficient alkali to neutralise exactly the free acid. The neutralised mixture is dried and unsaponifiable materials and esters removed by extracting with benzene. The resulting pure salts may be heated to remove traces of the extracting solvent, and then decomposed with a mineral acid to isolate the fatty acids. The neutralising alkali may be alkali, alkaline earth, or magnesium oxides, hydroxides or carbonates, in aqueous suspension or in the anhydrous state. An example is given of the treatment of an oxidation product of paraffin wax.

333,907. SEPARATING GAS MIXTURES. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. Application date, April 15, 1929.

A liquid is evaporated in contact with the gas mixture to be separated, and one or more constituents of the gas mixture



333,907

diffuses into the vapour. The mixture is supplied by a perforated pipe E to a space G surrounding an annular column F of clay balls or Raschig rings. A central cooling pipe K is provided. The liquid is preheated and distributed over the annulus F, and is vaporised by the gas mixture. The constituents of the mixture which diffuse through the vapour are drawn off at D, and the remainder at C, while the liquid is drawn off at A.

333,946. HALOGENATED ACETYLENE AND DIACETYLENES. A. Carpmal, London. From I.G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. Application date, May 25, 1929.

Halogenated acetylenes and derivatives are obtained by direct replacement of hydrogen combined with triply linked carbon atoms by means of chlorine or bromine, by treating the acetylene compound with an aqueous solution of a salt of hypochlorous or hypobromous acid in the presence of an excess of free alkali. Examples describe the preparation of dichloroacetylene, dichlorodiacetylene, dibromoacetylene, dibromodiacetylene, bromo- and chloro-propionic acid, 1-bromoacetyl-cyclohexanol-1, and diethyl-bromo-acetyl carbinol.

333,975. DEHYDROGENATED ORGANIC COMPOUNDS. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. Application date, June 5, 1929.

Mineral oils, benzenes, naphthenes, and products of the destructive hydrogenation of coal, tar, etc., are treated in the gaseous phase at 200°–300° C. with dehydrogenating catalysts consisting of mixtures of cobalt, iron, metals of groups 5–7 such as vanadium, molybdenum, tungsten, niobium, tantalum, chromium and manganese, and oxides of these, with additions of lead, tin, zinc, cadmium or their compounds, or solid oxides of the non-metals of the 5th group, *e.g.*, phosphorus, arsenic, antimony or their acids or salts. These are treated at temperatures above 200° C. with hydrogen compounds of the non-metals of groups 5–7 which are solid at ordinary temperature. Suitable compounds include hydrogen sulphide, hydrogen selenide, hydrogen phosphide, carbon disulphide and hydrogen iodide. The process may be combined with the distillation of benzene by passing the constituents boiling above 80° C. over the catalyst. Examples are given of the production of the catalyst from (1) ammonium molybdate, lead nitrate and phosphoric acid, pretreated with hydrogen selenide at 300° C.; (2) ammonium tungstate, cobalt nitrate and antimony acid, pretreated with hydrogen sulphide at 350° C.; (3) ammonium vanadate, cobalt nitrate and phosphoric acid, pretreated with hydrogen and carbon disulphide at 350° C.; (4) uranium oxide and cobalt oxide, pretreated with hydrogen and carbon disulphide at 350° C.; (5) ammonium molybdate, cobalt nitrate and phosphoric acid, pretreated with hydrogen and carbon disulphide. All these are deposited on active charcoal.

333,989. ALIPHATIC NITRILES. Imperial Chemical Industries, Ltd., Millbank, London, and T. S. Wheeler, Winnington Hall, Northwich, Cheshire. Application date, June 14, 1929.

Aliphatic nitriles are obtained by heating under a reflux condenser a metal cyanide and an aliphatic halide in the presence of the nitrile to be obtained.

333,991. ACETIC ANHYDRIDE. W. W. Groves, London. From E. B. Badger and Sons, 75, Pitts Street, Boston, U.S.A. Application date, June 17, 1929.

Acetic anhydride is obtained from anhydrous sodium acetate, sulphur chloride or sulphuryl chloride, and chlorine. The

79, receiver 81, and expansion valves 85 to the cooling coils, and the valves 85 may be operated after each addition of reagents to check undue rise of temperature, which is indicated by a thermometer 33 and should be a little below 10° C.

333,992. DYES AND INTERMEDIATE PRODUCTS. Imperial Chemical Industries, Ltd., Millbank, London, and W. W. Tatum, Crumpsall Vale Chemical Works, Blackley, Manchester. Application date, June 18, 1929.

1:5- or 1:8-diamino-anthraquinone or the mixture obtained by direct nitration and reduction of anthraquinone is converted into the sulphate salt, heated, and the product halogenated and condensed with an arylamine, *e.g.*, *p*-toluidine, to obtain a blue acid wool dye.

334,009. AROMATIC ALDEHYDES. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. Application date, July 4, 1929.

Neutral aromatic compounds are treated with carbon monoxide under pressure in the presence of anhydrous aluminium chloride, which is activated by a small addition of titanium chloride, with or without chlorides of iron and other metals found in aluminium ores. The reaction is initiated by adding a very small amount of mineral acid. In an example, benzaldehyde is obtained by treating benzene as above with a catalyst of anhydrous aluminium chloride containing 1 per cent. of titanium chloride. Toluene may be treated with a catalyst obtained from bauxite containing ferric and titanium oxides to obtain *p*-toluylaldehyde.

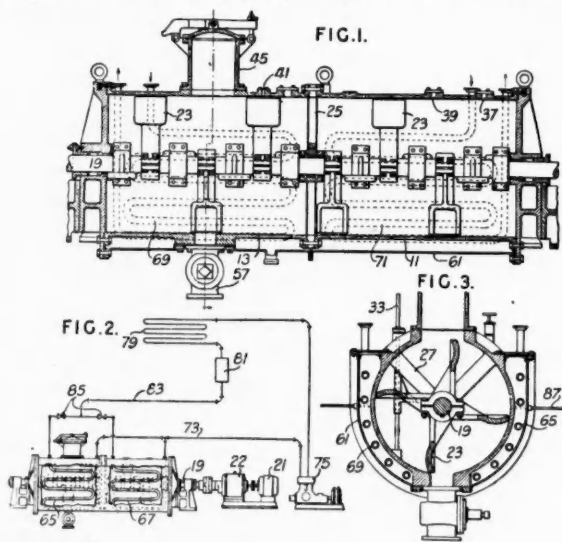
334,111. DYES. I.G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. International Convention date, October 22, 1928.

Naphthoylene-diaryl-imidazoles are obtained as described in Specifications 237,294, 265,232 and 265,964 (See THE CHEMICAL AGE, Vol. XIII, p. 333, and Vol. XVI, pp. 381 and 402), and are converted into other dyestuffs by nitration in the presence of sulphuric acid or nitrobenzene. Mono- or poly-nitro derivatives are obtained and are reduced to amino derivatives, which may be transformed into other compounds by the Sandmeyer reaction. Examples are given of the treatment of 1:4:5:8-naphthoylene-dibenz-imidazole as above to obtain a product dyeing cotton bluish-grey to black shades, 1:4:5:8-naphthoylene-4':4''-diethoxy-dibenz-imidazole (obtained by condensing 1:4:5:8-naphthalene-tetracarboxylic acid with 4-ethoxy-phenylene diamine), and 1:4:5:8 naphthoylene-1':2':1'':2''-dinaphthimidazole (obtained by condensing 1:4:5:8-naphthalene-tetracarboxylic acid with 1:2-naphthylene-diamine).

NOTE.—Abstracts of the following specifications which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention:—308,169 and 308,170 (Canadian Electro Products Co. Ltd.), relating to production of esters, see Vol. XX, p. 507; 308,281 (Govett, Ltd.), relating to bromine and iodine, see Vol. XX, p. 508; 310,871 (Goodyear Tire and Rubber Co.), relating to secondary aromatic amines, see Vol. XXI, p. 10; 312,043 (E. I. Du Pont de Nemours and Co.), relating to catalytic processes, see Vol. XXI, p. 90; 313,858 (L. Sturbelle), relating to production of zinc and other metals, see Vol. XXI, p. 23 (Metallurgical Section); 314,527 (I.G. Farbenindustrie Akt.-Ges.), relating to vat dyestuffs of the dithionaphthylenequinone series, see Vol. XXI, p. 203.

Specifications Accepted with Date of Application

- 314,439. Decarburising iron and steel and their alloys. Siemens and Halske Akt.-Ges. June 27, 1928.
 314,871. Heat-treatment of carbonaceous materials to obtain oils of low boiling point. Standard Oil Development Co. July 3, 1928.
 315,367. Promoting chemical reactions and physical processes by the use of a high-frequency rotary electric field. Method of W. Ludke. July 12, 1928.
 315,724. Malleable iron, Methods of making. British Thomson-Houston Co., Ltd. July 16, 1928.
 316,960. Electrolysis of fused electrolytes, Process and apparatus for carrying out. Kirsch, Kupfer-und Messingwerke Akt.-Ges. August 7, 1928.
 317,040. Sodium sulphite or bisulphite solutions. Manufacture of Zellstoffabrik Waldhof, and O. Faust. August 9, 1928.
 317,396. Sulphide trioxide, Preparation of. Calco Chemical Co., Inc., August 15, 1928.
 319,205. Catalytic alkylation of hydrocarbons, alcohols, organic acids, and amines. Rheinische Kampfer Fabrik Ges. September 17, 1928.



333,991

reaction chamber is provided with a cooling jacket through which brine from a refrigerator is circulated to control the rise of temperature. Sodium acetate is introduced into the reaction chamber through an opening 45, and the other reagents added through openings 37, 39, 41. A central shaft 19 carries stirrers 23, and is supported in the end plates and in a central bearing carried on arms 27 in a ring 25. A motor 21 drives the stirrer through reducing gear. A jacket 61 contains cooling coils 65, 67, 69, 71 connected to a compressor 75. Refrigerant is delivered through a condenser

- 335,893. Fast azo dyestuffs, Manufacture of. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*) April 30, 1929.
- 335,896. Dyestuffs, Manufacture of. W. W. Groves. (*Soc. of Chemical Industry in Basle*). June 25, 1929.
- 335,913. Urea, Manufacture of. W. W. Triggs. (*A. B. Lamb*). June 27, 1929.
- 335,947. Hydrogen cyanide. Imperial Chemical Industries, Ltd., T. S. Wheeler, H. A. T. Mills, J. McAulay, and W. B. Fletcher. March 27, 1929.
- 335,948. Halogenation of isocyclic compounds. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*). April 3, 1929.
- 335,950. Copper alloys. Vickers-Armstrongs, Ltd., W. Machin, and W. B. O. Goudielock. April 4, 1929.
- 335,962. Methanol, Manufacture of. H. Dreyfus. June 5, 1929.
- 335,965. Complex iron compounds, Manufacture of. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*). June 5, 1929.
- 335,970. Vulcanisation of artificial rubber-like masses. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*). July 2, 1929.
- 335,987. Electrolytic apparatus. A. E. Knowles. July 6, 1929. Addition to 320,388.
- 336,007. Finely divided metals from metal carbonyls, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*). July 10, 1929.
- 336,008. Diammonium phosphate, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*). July 10, 1929.
- 336,019. High percentage magnesium alloys, Process for improving. *I.G. Farbenindustrie Akt.-Ges.* April 25, 1929.
- 336,024. Stainless steel and process for the melting thereof. W. E. Martin and J. A. Berlyn. July 22, 1929.
- 336,061. Fast sulphur dyestuffs, Manufacture of. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*). September 2, 1929.
- 336,065. Phosphorus oxychloride, Production of. J. S. Dunn, F. Briers, and Imperial Chemical Industries, Ltd. September 6, 1929.
- 336,091. Iron and steel alloys. H. Wade. (*Taylor-Wharton Iron and Steel Co.*). October 4, 1929.
- 336,109. Electrolytic separation of copper. A. Mozer. October 29, 1928.
- 336,111. Thiourea, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*). October 19, 1929.
- 336,144. 4-10-diamino-ptylene, Manufacture of. F. Bensa. December 22, 1928.
- 336,181. Aluminium salts, Production of. *Colloid-Chemische Forschungs Akt.-Ges.* January 7, 1929.
- Scottish Dyes, Ltd., and Thomson, R. F. Production of vat dyestuffs. 31,306. October 18.
- I.G. Farbenindustrie Akt.-Ges.*, and Johnson, J. Y. Apparatus for oxidation of nitrites to nitrates. 30,600. October 13.
- Apparatus for manufacture and production of ethers. 30,601. October 13.
- Oxidation of hydrocarbons and waxes. 30,864. October 15.
- Manufacture of organic substances containing nitrogen. 30,865. October 15.
- Apparatus for manufacture of mixtures of nitrogen and hydrogen from bituminous fuels. 30,866. October 15.
- Water-tube boilers. 30,867. October 15.
- Purification of gas mixtures. 30,868. October 15.
- Manufacture of coating-compositions, etc. 30,869. October 15.
- Manufacture of ethyl acetate. 30,870. October 15.
- Pressure-hydrogenation of coal. 31,017. October 16.
- Incinerators. 31,018. October 16.
- Manufacture of valuable products from metal cyanates. 31,132. October 17.
- Manufacture of products containing nitrogen. 31,133. October 17.
- Apparatus for removal of foreign substances from gases. 31,134. October 17.
- I.G. Farbenindustrie Akt.-Ges.* Production of vinyl chloride. 30,639. October 13. (Germany, October 18, 1929.)
- Manufacture of viscose solutions. 30,888. October 15. (Germany, October 16, 1929.)
- Manufacture of azo-dyestuffs. 30,891. October 15. (Germany, October 16, 1929.)
- Manufacture of polymerisation products. 31,131. October 17. (Germany, January 28.)
- Bellows cameras. 31,183. October 17. (Germany, November 14, 1929.)
- Manufacture of aromatic compounds containing nitrogen. 31,184. October 17. (Germany, October 17, 1929.)
- Manufacture of 1:4:5:8-naphthalene-tetra-carboxylic acid and derivatives thereof. 31,185. October 17. (Germany, October 17, 1929.)
- Imperial Chemical Industries, Ltd., Smith, W., and Thomson, R. F. Production of anthracene derivatives. 30,988. October 16.
- Production of anthracene derivatives. 31,280. October 18.
- Imperial Chemical Industries, Ltd. Production of fertilisers. 31,087. October 17.
- Carrying out catalytic gas reactions. 31,279. October 18.
- Kodak, Ltd. (Eastman Kodak Co.). Dehydrating acetic acid. 30,739. October 14.
- Maclaurin, R. Recovering acid ammonium carbonate from ammonia liquors. 30,681. October 14.
- Mann, H. C. Manufacture of sulphuric acid from flue gases. 30,736. October 14.
- Meulen, J. H. van der. Preparation of iodides. 30,618. October 13. (Germany, October 14, 1929.)
- Roman, L. H. Manufacture of aldehydes, etc. 30,726. October 14. (France, July 19.)
- Salerni, P. M. Distillation and carbonisation of carbonaceous materials. 30,771. October 14.
- Distillation, etc., of carbonaceous materials. 31,148. October 17.

Applications for Patents

[In the case of applications for patents under the International Convention, the priority date (that is, the original application date abroad which the applicant desires shall be accorded to the patent) is given in brackets, with the name of the country of origin. Specifications of such applications are open to inspection at the Patent Office on the anniversary of the date given in brackets, whether or not they have been accepted.]

- Amber Size and Chemical Co., Ltd. Production of bituminous compositions. 30,552. October 13. (Germany, October 11, 1929.)
- Anglo Persian Oil Co., Ltd., Birch, S. F., and Scott, W. D. Production of mono alkyl ethers of glycols. 31,193. October 17.
- Carpmael, A., and *I.G. Farbenindustrie Akt.-Ges.* Manufacture of varnishes, etc. 30,745. October 14.
- Finishing textile materials. 31,048. October 16.
- Chemical Engineering and Wilton's Patent Furnace Co., Ltd., Wilton, N., and Wilton, T. O. Manufacture of sulphuric acid from flue gases. 30,736. October 14.
- Chemische Fabrik vorm. Sandoz. Non-dyeing sulphurised derivatives of phenol. 30,882. October 15. (Germany, October 19, 1929.)
- Coley, H. E. Distillation process for zinc oxides. 31,144. October 17.
- Gewerkshaft Victor. Production of ammonium sulphate nitrate. 30,928. October 15. (Germany, October 15, 1929.)
- Production of ammonium sulphate nitrate. 31,210, 31,211, 31,213. October 17. (Germany, October 17, 1929.)
- Green, H. E. J. Manufacture of sulphuric acid from flue gases. 30,736. October 14.
- Groves, W. W. and *I.G. Farbenindustrie Akt.-Ges.* Manufacture of optically active 1-phenyl-2-amino-alcohols (1). 30,886. October 15.
- Manufacture of derivatives of carbinol. 30,887. October 15.
- Manufacture of optically-active 1-phenyl-2-amino alcohols (1). 31,181. October 17.
- Manufacture of racemic 1-phenyl-2-amino-alcohols (1). 31,182. October 17.
- Hills, H. G. Manufacture of oil-borne pigments. 30,800. October 15.
- Separation of solids from liquids. 31,108. October 17.
- Hooley, L. J., Smith, W., Thomson, R. F., and Imperial Chemical Industries, Ltd. Production, etc., of vat dyes. 30,987. October 16.

The Ruhr Chemical Co.

THE report for 1929-30 of the Ruhr Chemical Co., which was formed three years ago to develop a new industry for the conversion of coke-oven gas, which formerly escaped as waste, into synthetic nitrate fertilisers, states that there was an output of 13,180 tons of synthetic nitrate by the company's first unit. Work on a second unit, bringing production capacity up to 55,000 tons a year, is about to be completed. Output was not up to capacity, owing to restrictions imposed by the German Ammonia Sales Cartel, of which the company is a member. On completion of the second manufacturing unit, however, the company, it is stated, will have a 37.93 per cent. quota in the cartel, and output will be correspondingly increased. Gross profits amounted to 3,665,056Rm. (£183,252). Of this sum, 1,926,295Rm. (£96,314) has been placed to depreciation, reserve, and 137,054Rm. (£6,852) written off for discount redemption of loans and loan expenses, total deductions amounting to 3,757,593Rm. (£187,879). Thus there was a net loss on working of 92,537Rm. (£4,627). Added to the deficit of 2,595,479Rm. (£129,773) carried forward from the previous year, this brings the total amount to be met before net profits are shown to 2,688,016 Rm. (£134,400).

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID ACETIC, 40% TECH.—£19 per ton.
 ACID CHROMIC.—Is. 0½d. per lb. d/d U.K.
 ACID HYDROCHLORIC.—Spot, 3s. 9d. to 6s. carboy d/d, according to purity, strength and locality.
 ACID NITRIC, 80° Tw.—Spot, £20 to £25 per ton makers' works, according to district and quality.
 ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.
 AMMONIA (ANHYDROUS).—Spot, 11d. per lb., d/d in cylinders.
 AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.
 BISULPHITE OF LIME.—£7 10s. per ton, f.o.r. London, packages free.
 BLEACHING POWDER, 35/37%.—Spot, £7 10s. per ton d/d station in casks, special terms for contracts.
 BORAX, COMMERCIAL.—Crystals, £13 10s. per ton; granulated, £12 10s. per ton; powder, £14 per ton. (Packed in 1 cwt. bags, carriage paid any station in Great Britain. Prices quoted are for one ton lots and upwards).
 CALCIUM CHLORIDE (SOLID), 70/75%.—Spot, £4 15s. to £5 5s. per ton d/d in drums.
 CHROMIUM OXIDE.—9½d. and 10d. per lb. according to quantity d/d U.K.
 CHROMETAN.—Crystals, 3½d. per lb. Liquor, £18 10s. per ton d/d U.K.
 COPPER SULPHATE.—£25 to £25 10s. per ton.
 METHYLATED SPIRIT 61 O.P.—Industrial, 1s. 7d. to 1s. 11d. per gall. pyridinised industrial, 1s. 9d. to 2s. 1d. per gall.; mineralised, 2s. 8d. to 2s. 11d. per gall. 64 O.P., 1d. extra in all cases. Prices according to quantity.
 NICKEL SULPHATE.—£38 per ton d/d.
 NICKEL AMMONIA SULPHATE.—£38 per ton d/d.
 POTASH CAUSTIC.—£30 to £33 per ton.
 POTASSIUM BICHROMATE CRYSTALS AND GRANULAR.—4½d. per lb. nett d/d U.K., discount according to quantity; ground ½d. per lb. extra.
 POTASSIUM CHLORATE.—3½d. per lb., ex-wharf, London, in cwt. kegs.
 POTASSIUM CHROMATE.—8d. per lb. d/d U.K.
 SALAMMONIAC.—Firsts lump, spot, £42 10s. per ton d/d station in barrels. Chloride of ammonia, £37 to £45 per ton, carr. paid.
 SALT CAKE, UNGROUND.—Spot, £3 7s. 6d. per ton d/d station in bulk.
 SODA ASH, 58° E.—Spot, £6 per ton, f.o.r. in bags, special terms for contracts.
 SODA CAUSTIC, SOLID, 76/77° E.—Spot, £14 10s. per ton, d/d station.
 SODA CRYSTALS.—Spot, £5 to £5 5s. per ton, d/d station or ex depot in 2-cwt. bags.
 SODIUM ACETATE 97/98%.—£21 per ton.
 SODIUM BICARBONATE, REFINED.—Spot, £10 10s. per ton d/d station in bags.
 SODIUM BICHROMATE CRYSTALS.—3½d. per lb. nett d/d U.K., discount according to quantity. Anhydrous ½d. per lb. extra.
 SODIUM BISULPHITE POWDER, 60/62%.—£17 10s. per ton delivered for home market, 1-cwt. drums included; £15 10s. f.o.b. London.
 SODIUM CHLORATE.—2½d. per lb.
 SODIUM CHROMATE.—3½d. per lb. d/d U.K.
 SODIUM NITRITE.—Spot, £19 per ton, d/d station in drums.
 SODIUM PHOSPHATE.—£14 per ton, f.o.b. London, casks free.
 SODIUM SILICATE, 140° Tw.—Spot, £8 5s. per ton, d/d station returnable drums.
 SODIUM SULPHATE (GLAUBER SALTS).—Spot, £4 2s. 6d. per ton, d/d address in bags.
 SODIUM SULPHIDE SOLID, 60/62%.—Spot, £10 5s. per ton d/d station in drums. Crystals—Spot, £7 10s. per ton d/d station in casks.
 SODIUM SULPHITE, PEA CRYSTALS.—Spot, £13 10s. per ton, d/d station in kegs. Commercial—Spot, £9 per ton, d/d station in bags.

Coal Tar Products

ACID CARBOLIC CRYSTALS.—6d. to 7½d. per lb. Crude 60's 1s. 4½d. to 2s. per gall. August/December.
 ACID CRESYLIC 99/100.—2s. 2d. to 2s. 3d. per gall. B.P., 5s. per gall. 97/99.—2s. 1d. to 2s. 2d. per gall. Refined, 2s. 7d. to 2s. 10d. per gall. Pale, 95%, 1s. 9d. to 1s. 10d. per gall. 98%, 1s. 11d. to 2s. Dark, 1s. 6d. to 1s. 7d.
 ANTHRACENE.—A quality, 2d. to 2½d. per unit. 40%, £4 10s. per ton.
 ANTHRACENE OIL, STRAINED, 1080/1090.—4½d. to 5½d. per gall. 1100, 5½d. to 6d. per gall.; 1110, 6d. to 6½d. per gall. Unstrained (Prices only nominal).
 BENZOLE.—Prices at works: Crude, 8d. to 9d. per gall.; Standard Motor, 1s. 3½d. to 1s. 4½d. per gall.; 90%, 1s. 5d. to 1s. 6d. per gall.; Pure, 1s. 8d. to 1s. 9d. per gall.

TOLUOLE.—90%, 1s. 8d. to 1s. 9d. per gall. Pure, 1s. 9½d. to 1s. 11½d. per gall.
 XYLOL.—Is. 4½d. to 1s. 10d. per gall. Pure, 1s. 7½d. to 2s. 1d. per gall.
 CREOSOTE.—Cresylic, 20/24%, 6½d. to 7d. per gall.; Heavy, for Export, 6d. to 6½d. per gall. Home, 4d. per gall. d/d. Middle oil, 4½d. to 5d. per gall. Standard specification, 3d. to 4d. per gall. Light gravity, 1½d. to 1¾d. per gall. ex works. Salty, 7½d. per gall.
 NAPHTHA.—Crude, 8½d. to 8¾d. per gall. Solvent, 90/160, 1s. 2½d. to 1s. 3d. per gall. Solvent, 95/160, 1s. 3½d. to 1s. 5d. per gall. Solvent 90/190, 11d. to 1s. 2d. per gall.
 NAPHTHALENE, CRUDE.—Drained Creosote Salts, £3 to £5 per ton. Whizzed, £4 to £5 per ton. Hot-pressed, £8 per ton.
 NAPHTHALENE.—Crystals, £10 per ton. Purified Crystals, £14 10s. per ton. Flaked, £11 per ton.
 PITCH.—Medium soft, 46s. to 47s. 6d. per ton, f.o.b., according to district. Nominal.
 PYRIDINE.—90/140, 3s. 6d. to 4s. per gall. 90/160, 3s. 6d. to 3s. 9d. per gall. 90/180, 1s. 9d. to 2s. 3d. per gall. Heavy prices only nominal.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:—
 ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb.
 ACID ANTHRANILIC.—6s. per lb. 100%.
 ACID GAMMA.—Spot, 3s. 9d. per lb. 100% d/d buyer's works.
 ACID H.—Spot, 2s. 3d. per lb. 100% d/d buyer's works.
 ACID NAPHTHIONIC.—1s. 5d. per lb. 100% d/d buyer's works.
 ACID NEVILLE AND WINTHER.—Spot, 2s. 7d. per lb. 100% d/d buyer's works.
 ACID SULPHANILIC.—Spot, 8½d. per lb. 100% d/d buyer's works.
 ANILINE OIL.—Spot, 8½d. per lb., drums extra, d/d buyer's works.
 ANILINE SALTS.—Spot, 8½d. per lb. d/d buyer's works.
 BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra, d/d buyer's works.
 BENZIDINE BASE.—Spot, 2s. 6d. per lb. 100% d/d buyer's works.
 BENZOIC ACID.—Spot, 1s. 8½d. per lb. d/d buyer's works.
 o-CRESOL 30/31° C.—£3 1s. 10d. per cwt., in 1 ton lots.
 m-CRESOL 98/100%.—2s. 9d. per lb., in ton lots.
 p-CRESOL 34.5° C.—1s. 9d. per lb., in ton lots.
 DICHLORANILINE.—1s. 10d. per lb. f.o.r. works.
 DIMETHYLANILINE.—Spot, 1s. 8d. per lb., drums extra d/d buyer's works.
 DINITROBENZENE.—8d. per lb.
 DINITROCHLOROBENZENE.—£74 per ton d/d.
 DINITROTOLUENE.—48/50° C., 7½d. per lb.; 66/68° C., 9d. per lb., f.o.r. works.
 DIPHENYLAMINE.—Spot, 1s. 8d. per lb. d/d buyer's works.
 a-NAPHTHOL.—Spot, 1s. 11d. per lb. d/d buyer's works.
 B-NAPHTHOL.—Spot, £65 per ton in 1 ton lots, d/d buyer's works.
 a-NAPHTHYLAMINE.—Spot, 1s. per lb. d/d buyer's works.
 B-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.
 o-NITRANILINE.—5s. 11d. per lb.
 m-NITRANILINE.—Spot, 2s. 6d. per lb. d/d buyer's works.
 p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.
 NITROBENZENE.—Spot, 6½d. per lb., 5-cwt. lots, drums extra, d/d buyer's works.
 NITRONAPHTHALENE.—9d. per lb.
 R. SALT.—Spot, 2s. per lb. 100% d/d buyer's works.
 SODIUM NAPHTHIONATE.—Spot, 1s. 6½d. per lb. 100% d/d buyer's works.
 o-TOLUIDINE.—Spot, 8d. per lb., drums extra, d/d buyer's works.
 p-TOLUIDINE.—Spot, 1s. 9d. per lb. d/d buyer's works.
 m-XYLIDINE ACETATE.—3s. 1d. per lb., ex works.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 to £8 5s. per ton. Grey, £14 to £15 per ton. Liquor, 9d. per gall.
 ACETONE.—£73 per ton.
 CHARCOAL.—£6 to £8 3s. per ton, according to grade and locality
 IRON LIQUOR.—1s. 3d. per gall. 32° Tw. 1s. per gall. 24° Tw.
 RED LIQUOR.—9d. per gall. 16° Tw.
 WOOD CREOSOTE.—1s. 9d. per gall., unrefined.
 WOOD NAPHTHA, MISCIBLE.—3s. to 3s. 2d. per gall. Solvent.
 4s. per gall.
 WOOD TAR.—£4 5s. to £5 per ton.
 BROWN SUGAR OF LEAD.—£37 per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6d. to 1s. 2d. per lb., according to quality; Crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.
 ARSENIC SULPHIDE, YELLOW.—1s. 8d. to 1s. 10d. per lb.

BARYTES.—£5 10s. to £7 per ton, according to quality.
 CADMIUM SULPHIDE.—4s. 6d. to 5s. per lb.
 CARBON BISULPHIDE.—£26 to £28 per ton, according to quantity; drums extra.
 CARBON BLACK.—3½d. to 4½d. per lb., ex wharf.
 CARBON TETRACHLORIDE.—£40 to £50 per ton, according to quantity; drums extra.
 CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.
 DIPHENYLGUANIDINE.—2s. 9d. per lb.
 LITHOPONE, 30%.—£20 to £22 per ton.
 SULPHUR.—£9 10s. to £13 per ton, according to quality.
 SULPHUR CHLORIDE.—4d. to 7d. per lb., carboys extra.
 SULPHUR PRECIP. B.P.—£55 to £60 per ton, according to quantity.
 VERMILION, PALE OR DEEP.—6s. 6d.—7s. per lb.
 ZINC SULPHIDE.—8d. to 11d. per lb.

Pharmaceutical and Photographic Chemicals

ACID, ACETIC, PURE, 80%.—£38 5s. per ton, for ¼ ton lots, £37 5s. for 1 ton, smaller quantities £39 5s., delivered, barrels free.
 ACID, ACETYL SALICYLIC.—2s. 9d. to 2s. 11d. per lb., according to quantity.
 ACID, BENZOIC B.P.—2s. to 2s. 3d. per lb., for synthetic product, according to quantity. Solely ex Gum, 1s. 3d. to 1s. 6d. per oz.; 50-oz. lots, 1s. 3d. per oz.
 ACID, BORIC B.P.—Crystal, £31 per ton; powder, £32 per ton; For one-ton lots and upwards. Packed in 1-cwt. bags carriage paid any station in Great Britain.
 ACID, CAMPHORIC.—19s. to 21s. per lb.
 ACID, CITRIC.—1s. 5d. to 1s. 6d. per lb., less 5%.
 ACID, GALLIC.—2s. 11d. per lb. for pure crystal, in cwt. lots.
 ACID, MOLYBDIC.—5s. 3d. per lb. in ¼-cwt. lots. Packages extra. Special prices for quantities and contracts.
 ACID, PYROGALLIC, CRYSTALS.—7s. 3d. per lb. Resublimed, 8s. 3d.
 ACID, SALICYLIC, B.P. PULV.—1s. 5d. to 1s. 8d. per lb. Technical.—1s. to 1s. 2d. per lb.
 ACID, TANNIC B.P.—2s. 8d. to 2s. 10d. per lb.
 ACID, TARTARIC.—1s. per lb., less 5%.
 AMIDOL.—7s. 6d. to 11s. 3d. per lb., according to quantity.
 AMMONIUM BENZOATE.—3s. 9d. per lb.
 AMMONIUM CARBONATE B.P.—£36 per ton. Powder, £39 per ton in 5-cwt. casks. Resublimed, 1s. per lb.
 AMMONIUM MOLYBDATE.—4s. 9d. per lb. in ¼-cwt. lots. Packages extra. Special prices for quantities and contracts.
 ATROPHINE SULPHATE.—8s. per oz.
 BARBITONE.—5s. 9d. to 6s. per lb.
 BISMUTH CARBONATE.—6s. 6d. per lb.
 BISMUTH CITRATE.—6s. 9d. per lb.
 BISMUTH SALICYLATE.—6s. 7d. per lb.
 BISMUTH SUBNITRATE.—5s. 6d. per lb.
 BISMUTH NITRATE.—Cryst. 4s. 4d. per lb.
 BISMUTH OXIDE.—8s. 6d. per lb.
 BISMUTH SUBCHLORIDE.—8s. per lb.
 BISMUTH SUBGALLATE.—6s. 9d. per lb. Extra and reduced prices for smaller and larger quantities of all bismuth salts respectively.
 BISMUTH ET AMMON LIQUOR.—Cit. B.P. in W. Qts. 1s. 0½d. per lb.; 12 W. Qts. 11½d. per lb.; 36 W. Qts. 11d. per lb.
 BORAX B.P.—Crystal, £21 10s. per ton; powder, £22 per ton; for one-ton lots and upwards. Packed in 1-cwt. bags carriage paid any station in Great Britain.
 BROMIDES.—Ammonium, 1s. 9d. per lb.; potassium, 1s. 4½d. per lb.; granular, 1s. 5d. per lb.; sodium, 1s. 7d. per lb. Prices for 1-cwt. lots.

CAFFEIN, PURE.—7s. 6d. per lb.
 CAFFEIN CITRAS.—5s. 9d. per lb.
 CALCIUM LACTATE.—B.P., 1s. 1½d. to 1s. 6d. per lb., in 1-cwt. lots.
 CAMPHOR.—Refined flowers, 2s. 10d. to 3s. per lb., according to quantity; also special contract prices.
 CHLOROFORM.—2s. 4½d. to 2s. 7½d. per lb., according to quantity.
 EMETINE HYDROCHLORIDE.—58s. 6d. per oz.
 EMETINE BISMUTH IODIDE.—33s. per oz.
 EPHEDRINE, PURE.—13s. 9d. to 14s. 6d. per oz.
 EPHEDRINE HYDROCHLORIDE.—10s. 9d. to 11s. 6d. per oz.
 EPHEDRINE SULPHATE.—10s. 9d. to 11s. 6d. per oz.
 ERGOSTEROL.—2s. 6d. per gm.
 ETHERS.—S.G. .730—1s. to 1s. 1d. per lb., according to quantity; other gravities at proportionate prices.
 FORMALDEHYDE, 40%.—37s. per cwt., in barrels, ex wharf.
 GLUCOSE, MEDICINAL.—1s. 6d. to 2s. per lb. for large quantities.
 HEXAMINE.—2s. 3d. to 2s. 6d. per lb.
 HOMATROPINE HYDROBROMIDE.—27s. 6d. per oz.
 HYDRASTINE HYDROCHLORIDE.—85s. per oz. for small quantities.
 HYDROGEN PEROXIDE (12 VOLS.).—1s. 4d. per gallon, f.o.r. makers' works, naked. B.P., 10 vols., 2s. to 2s. 3d. per gall.; 20 vols., 3s. per gall.
 HYDROQUINONE.—3s. 9d. to 4s. per lb., in cwt. lots.
 HYPOPHOSPHITES.—Calcium, 2s. 11d. to 3s. 4d. per lb.; potassium, 3s. 2d. to 3s. 7d. per lb.; sodium, 3s. 1d. to 3s. 6d. per lb.; for 28-lb. lots.
 IRON AMMONIUM CITRATE.—B.P., 2s. 5d. per lb., for 28-lb. lots. Green, 3s. 1d. per lb., list price. U.S.P., 3s. 3d. per lb. list price

IRON PERCHLORIDE.—18s. to 20s. per cwt., according to quantity.
 IRON QUININE CITRATE.—B.P., 8½d. to 8¾d. per oz., according to quantity.
 MAGNESIUM CARBONATE.—Light commercial, £31 per ton net.
 MAGNESIUM OXIDE.—Light Commercial, £62 10s. per ton, less 2½%; Heavy commercial, £21 per ton, less 2½%; in quantity lower; Heavy Pure, 2s. to 2s. 3d. per lb.
 MENTHOL.—A.B.R. recrystallised B.P., 15s. per lb. net; Synthetic, 8s. 6d. to 10s. 6d. per lb.; Synthetic detached crystals, 8s. 6d. to 10s. 6d. per lb., according to quantity; Liquid (95%), 9s. per lb.
 MERCURIALS B.P.—Up to 1-cwt. lots, Red Oxide, crystals, 8s. 4d. to 8s. 5d. per lb., levig., 7s. 10d. to 7s. 11d. per lb.; Corrosive Sublimate, Lump, 6s. 7d. to 6s. 8d. per lb., Powder, 6s. to 6s. 1d. per lb.; White Precipitate, Lump, 6s. 9d. to 6s. 10d. per lb., Powder, 6s. 10d. to 6s. 11d. per lb., Extra Fine, 6s. 11d. to 7s. per lb.; Calomel, 7s. 2d. to 7s. 3d. per lb.; Yellow Oxide, 7s. 8d. to 7s. 9d. per lb.; Persulph, B.P.C., 6s. 11d. to 7s. per lb.; Sulph. nig., 6s. 8d. to 6s. 9d. per lb. Special prices for larger quantities.

METHYL SALICYLATE.—1s. 3d. to 1s. 5d. per lb.
 PARALDEHYDE.—1s. 4d. per lb.
 PHENACETIN.—3s. 9d. to 4s. 1d. per lb.
 PHENOLPHTHALEIN.—5s. 11d. to 6s. 1½d. per lb.
 PILOCARPINE NITRATE.—10s. 6d. per oz.
 POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—89s. per cwt., less 2½ per cent.
 POTASSIUM CITRATE.—B.P.C., 2s. 2d. to 3s. per lb.
 POTASSIUM FERRICYANIDE.—1s. 7½d. per lb., in 125-lb. kegs.
 POTASSIUM IODIDE.—16s. 8d. to 17s. 9d. per lb., according to quantity.
 POTASSIUM METABISULPHITE.—6d. per lb., 1 cwt. kegs included, f.o.r. London.
 POTASSIUM PERMANGANATE.—B.P. crystals, 5½d. per lb., spot.
 QUININE SULPHATE.—1s. 8d. per oz. for 1,000-oz. lots.
 QUINOPHAN.—B.P.C., 14s. 6d. to 16s. 6d. per lb. for cwt. lots.
 SACCHARIN.—43s. 6d. per lb.
 SALICIN.—18s. 6d. per lb.
 SODIUM BARBITONUM.—8s. 6d. to 9s. per lb. for 1-cwt. lots.
 SODIUM BENZOATE B.P.—1s. 9d. per lb. for 1-cwt. lots.
 SODIUM CITRATE.—B.P.C. 1911, 1s. 10d. to 2s. 8d. per lb. B.P.C. 1923, and U.S.P., 2s. 2d. to 3s. per lb.
 SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£15 per ton, d/d consignee's station in 1-cwt. kegs.
 SODIUM NITROPRUSSIDE.—16s. per lb.
 SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—95s. to 100s. per cwt. net. Crystals, 2s. 6d. per cwt. extra.
 SODIUM SALICYLATE.—Powder, 1s. 10d. to 2s. 2d. per lb. Crystal, 1s. 11d. to 2s. 3d. per lb.
 SODIUM SULPHIDE, PURE RECRYSTALLISED.—10d. to 1s. 2d. per lb.
 SODIUM SULPHITE, ANHYDROUS.—£27 10s. to £29 10s. per ton, according to quantity. Delivered U.K.
 STRYCHNINE, ALKALOID CRYSTAL, 2s. per oz.; hydrochloride, 1s. 9½d. per oz.; nitrate, 1s. 8d. per oz.; sulphate, 1s. 9d. per oz. for 1,000-oz. quantities.
 TARTAR EMETIC, B.P.—Crystal or powder, 1s. 9d. to 2s. per lb.
 THYMOL.—Puriss, 7s. 3d. to 8s. per lb., according to quantity. Natural, 12s. per lb.

Perfumery Chemicals

ACETOPHENONE.—7s. per lb.
 AUBEPINE (EX ANETHOL).—12s. per lb.
 AMYL ACETATE.—2s. 6d. per lb.
 AMYL BUTYRATE.—5s. per lb.
 AMYL CINNAMIC ALDEHYDE.—10s. per lb.
 AMYL SALICYLATE.—2s. 6d. per lb.
 ANETHOL (M.P. 21/22° C.).—7s. per lb.
 BENZALDEHYDE FREE FROM CHLORINE.—2s. 6d. per lb.
 BENZYL ACETATE FROM CHLORINE-FREE BENZYL ALCOHOL.—1s. 10d. per lb.
 BENZYL ALCOHOL FREE FROM CHLORINE.—1s. 10d. per lb.
 BENZYL BENZOATE.—2s. 6d. per lb.
 CINNAMIC ALDEHYDE NATURAL.—13s. 3d. per lb.
 COUMARIN.—12s. per lb.
 CITRONELLOL.—7s. 9d. per lb.
 CITRAL.—7s. 6d. per lb.
 ETHYL CINNAMATE.—6s. 6d. per lb.
 ETHYL PHTHALATE.—2s. 9d. per lb.
 EUGENOL.—8s. 9d. per lb.
 GERANIOL (PALMAROSA).—17s. per lb.
 GERANIOL.—7s. 6d. to 10s. per lb.
 HELIOTROPINE.—6s. per lb.
 ISO EUGENOL.—10s. 9d. per lb.
 LINALOL, EX BOIS DE ROSE.—6s. per lb. Ex Shui Oil, 6s. per lb.
 LINALYL ACETATE, EX BOIS DE ROSE.—8s. 6d. per lb. Ex Shui Oil, 8s. 6d. per lb.
 MUSK XYLOL.—6s. 3d. per lb.
 PHENYL ETHYL ACETATE.—11s. per lb.
 PHENYL ETHYL ALCOHOL.—9s. per lb.
 RHODINOL.—46s. per lb.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. R. W. Greeff & Co. Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.

London, October 23, 1930.

THE chemical market has received a fairly steady demand during the current week, with prices on the whole unchanged and very steady. There is an increasing amount of inquiry being received on export account.

General Chemicals

ACETONE.—Unchanged at £70 10s. to £80 per ton according to quantity and there is a steady call for same.
ACID ACETIC.—The market is firm at £36 5s. to £38 5s. per ton for technical 80% and pure at £37 5s. to £39 5s. free delivered to buyers' works, with the demand being up to normal.
ACID CITRIC.—Still in rather quiet request with prices unchanged at about 1s. 6d. per lb. less 5%.
ACID LACTIC.—In better request with pale 50% by weight quoted at £41 to £42 per ton and the market remains firm.
ACID OXALIC.—Continues active at £30 7s. 6d. to £32 per ton according to quantity, and the market is very firm.
ACID TARTARIC.—The market is without special feature and prices are a shade easier at about 1s. per lb., less 5%.
ALUMINA SULPHATE.—In satisfactory demand with prices firm at £8 to £8 15s. per ton for the 17/18% iron free quality.
CREAM OF TARTAR.—In a little better demand and price is firm at 87s. 6d. to 88s. per cwt. ex warehouse London.
COPPER SULPHATE.—There is rather more inquiry with price unchanged at about £21 to £21 10s. per ton free on rails London, material packed in bags.
FORMALDEHYDE.—Being called for in steady quantities and the price is unchanged at about £32 per ton ex wharf London, for 40% by volume.
LEAD ACETATE.—The market is again steady at about £36 10s. for white and £35 10s. for brown for early delivery.
LEAD NITRATE.—Price is unchanged at £29 10s. per ton and in steady request.
LITHOPONE.—There is a steady demand at about £19 15s. to £23 per ton according to grade and quantity.
POTASSIUM CARBONATE.—96/98% arsenic free quality is quoted at £28 to £29 per ton and in good demand.
PERMANGANATE OF POTASH B.P. NEEDLE CRYSTALS.—The market is unchanged at about 5½d. per lb. and the product is in steady demand.

Nitrogen Fertilisers

Sulphate of Ammonia.—Export.—The market continues quiet with producers offering at £7 to £7 5s. per ton, according to quantity, f.o.b. U.K. port in single bags for prompt shipment. At present there is very little interest. **Home.**—British producers have announced home prices until June 30 next as follows:—October, £9 1s.; November, £9 3s.; December, £9 5s.; 1931: January, £9 8s.; February/June, £9 10s. (Delivered in 6-ton lots to consumer's nearest station). Terms of sale and discount to merchants appear to be the same as last year. Throughout the scale the above prices represent a reduction of 12s. per ton on the prices operating for last season. The price of this product has now dropped steadily since the year 1920-21, when the spring price to farmers was £24 11s. This decade, which has ushered in a great augmentation of production from synthetic sources, has witnessed a drop in price to British farmers of 61 per cent.

Nitrate of Soda.—The introduction of the price scale of this product in the United States has not been followed by the usual heavy buying. This is no doubt due to financial reasons and we anticipate that deliveries will resume their normal scale when the consuming season is nearer at hand.

Scottish Coal Tar Products

SOME anxiety is being caused by the want of orders for coal tar pitch, and meantime distillers are curtailing the production of this product as much as possible. Other products continue rather dull, with stocks high and prices easy.

Cresylic Acid.—Orders are quite inadequate to cope with production, and makers' quotations are lower. Pale, 99/100%, 1s. 8d. to 1s. 9d. per gallon; pale, 97/99%, 1s. 7d. to 1s. 8d. per gallon; dark, 97/99%, 1s. 6d. to 1s. 7d. per gallon; high boiling, 1s. 7½d. to 1s. 9½d. per gallon; all in bulk quantities f.o.r. works.

Carbolic Sixties.—There are no inquiries and value is nominal at 2s. per gallon for grades containing under 5% water.

Creosote Oil.—Trading continues quite regular in virgin oils. Specification oil, 2½d. to 3d. per gallon; gas works ordinary, 3½d.

SODIUM BICHROMATE.—A regular business is passing at 3½d. per lb. with usual discounts for contracts, at which price the market is firm.

SODIUM HYPOSULPHITE.—Commercial crystals are quoted £8 10s. and photographic crystals at £14 15s., the market showing no change.

SULPHIDE OF SODA.—In steady demand at £10 5s. to £11 5s. for the solid material and £11 5s. to £12 5s. for broken material; carriage paid.

TARTAR EMETIC.—In fairly good request at about 11d. per lb.

ZINC SULPHATE.—Rather more business is passing and the market is quoted at about £12 to £12 5s. per ton.

Coal Tar Products

INQUIRY for Coal Tar Products still holds good, but production is continually falling off. Prices remain unchanged, and as far as we can ascertain, the actual business which is being done is small.

MOTOR BENZOL.—Remains at about 1s. 5½d. to 1s. 6½d. per gallon f.o.r.

SOLVENT NAPHTHA.—Unchanged at about 1s. 2½d. to 1s. 3d. per gallon.

HEAVY NAPHTHA.—Quoted at about 1s. 1d. per gallon f.o.r.

CREOSOTE OIL.—Remains at 3d. to 3½d. per gallon f.o.r. in the North, and at 4d. to 4½d. per gallon in London.

CRESYLIC ACID.—Quoted at 1s. 8d. per gallon for the 98/100% quality, and at 1s. 6d. per gallon for the dark quality 95/97%.

NAPHTHALENES.—Unchanged, the firelighter quality remaining at £3 10s. to £3 15s. per ton, the 74/76 quality at about £4 to £4 5s. per ton, and the 76/78 quality at about £5 per ton.

PITCH.—Obtaining 37s. 6d. to 42s. 6d. per ton, f.o.b. East Coast port.

The following additional prices have been received:

Carbolic Acid.—Generally speaking, the position is unchanged, with prices from 7d. to 7½d. per lb., according to quantity.

Cresylic Acid.—No change in the prices previously indicated.

Vanillin.—No change. Clove Oil material is still selling at 14s. per lb., in 1-cwt. lots.

Phenolphthalein.—Quiet; business is being maintained at schedule prices of 5s. 11d. to 6s. 1½d. per lb.

Salicylic Acid B.P. Crystals.—Prices are 1s. 5d. to 1s. 8d. per lb., according to quantity.

to 3½d. per gallon; washed oil, 3d. to 3½d. per gallon; all ex makers, works in bulk.

Coal Tar Pitch.—Orders are extremely scarce and value is about 45s. per ton f.a.s. Glasgow for export and about 45s. per ton f.o.r. works for home delivery.

Blast Furnace Pitch.—Controlled prices are unchanged at 30s. per ton f.o.r. works for home trade, and 35s. per ton f.a.s. Glasgow for export.

Refined Coal Tar.—There are a few shipping inquiries. Makers' quotations remain at 3d. to 3½d. per gallon ex works.

Blast Furnace Tar.—Very quiet at 2½d. per gallon.

Crude Naphtha.—Available supplies are being sold at about 4d. per gallon free on rails in buyers' tanks.

Water White Products.—Very little interest is being taken, and quotations reflect the position. Motor benzole is 1s. 4½d. to 1s. 5d. per gallon; 90/160 solvent, 1s. 2d. to 1s. 3d. per gallon; 90/100 heavy solvent, 1s. to 1s. 0½d. per gallon; all in buyers' packages free on rails.

South Wales By-Products

SOUTH Wales by-product activities remain unchanged. Business in most products is unsatisfactory, and the immediate outlook is far from bright. Pitch continues to have a slow and sporadic market, but, with patent fuel exports increasing, there are possibilities of a greatly improved demand in the near future. Quotations are unchanged. Road tar has a fair call round about 13s. per 40-gallon barrel. Naphthas are slow, heavy having scarcely any call round about 11d. to 1s. 1d. per gallon, and solvent is only a little better at about 1s. 3½d. per gallon. Refined tars have a steady, if moderate, call, with quotations for gasworks and coke oven tar unchanged. Creosote continues to have a weak market, but values are unchanged. Motor benzol is in fair demand. Patent fuel and coke exports are better. Patent fuel prices for export are as follows: 21s. 6d., ex-ship Cardiff; 20s., ex-ship Newport; 20s., ex-ship Swansea. Coke prices for export are: Best foundry, 34s. to 36s. 6d.; good foundry, 26s. to 30s.; furnace, 17s. 6d. to 21s. 6d. Oil imports into Swansea during the four weeks ending October 14 amounted to 25,294,300 gallons.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing this firm's independent and impartial opinions.

Glasgow, October 21, 1930.

THE Scottish heavy chemical market for home and export inquiries continues to be steady. The trend is upward and prospects are brighter.

Industrial Chemicals

ACETONE.—B.G.S.—£71 10s. to £80 per ton, ex wharf, according to quantity. Inquiry remains satisfactory.

ACID, ACETIC.—Prices ruling are as follows: glacial, 98/100%, £47 to £58 per ton; pure, £37 5s. per ton; technical, 80%, £36 5s., delivered in minimum 1-ton lots.

ACID, BORIC.—Granulated commercial, £22 per ton; crystals, £23; B.P. crystals, £31 per ton; B.P. powder, £32 per ton, in 1-cwt. bags, delivered free Great Britain in one-ton lots upwards.

ACID, HYDROCHLORIC.—Usual steady demand. Arsenical quality, 4s. per carboy. Dearsenicated quality, 5s. per carboy, ex works, full wagon loads.

ACID, NITRIC, 80° QUALITY.—£23 per ton, ex station, full truck loads.

ACID, OXALIC.—98/100%.—On offer at the same price, viz.: 3½d. per lb., ex store. On offer from the Continent at 3½d. per lb., ex wharf.

ACID, SULPHURIC.—£3 2s. 6d. per ton, ex works, for 144° quality; £5 15s. per ton for 168°. Dearsenicated quality, 20s. per ton extra.

ACID, TARTARIC, B.P. CRYSTALS.—Quoted 11½d. per lb., less 5%, ex wharf. On offer for prompt delivery from the Continent at 1s. per lb., less 5%, ex wharf.

ALUMINA SULPHATE.—Quoted at round about £8 15s. per ton, ex store.

ALUM, LUMP POTASH.—Now quoted £8 7s. 6d. per ton., c.i.f. U.K. ports. Crystal meal, about 2s. 6d. per ton less.

AMMONIA ANHYDROUS.—Quoted 10½d. per lb., containers extra and returnable.

AMMONIA CARBONATE.—Lump quality quoted £36 per ton. Powdered, £38 per ton, packed in 5 cwt. casks, delivered U.K. stations or f.o.b. U.K. ports.

AMMONIA LIQUID, 880°.—Unchanged at about 2½d. to 3d. per lb., delivered, according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture quoted £21 to £22 per ton, ex station. Fine white crystals offered from the Continent at about £17 5s. per ton, c.i.f. U.K. ports.

ANTIMONY OXIDE.—Spot material obtainable at round about £31 per ton, ex wharf. On offer for shipment from China at about £29 per ton, c.i.f. U.K.

ARSENIC, WHITE POWDERED.—Quoted £19 per ton, ex wharf, prompt shipment from mines. Spot material still on offer at £20 5s. per ton, ex store.

BARIUM CHLORIDE.—In good demand and price about £11 per ton, c.i.f. U.K. ports. For Continental material our price would be £10 per ton, f.o.b. Antwerp or Rotterdam.

BLEACHING POWDER.—British manufacturers' contract price to consumers unchanged at £6 15s. per ton, delivered in minimum 4-ton lots. Continental now offered at about the same figure.

CALCIUM CHLORIDE.—Remains unchanged. British manufacturers' price, £4 15s. to £5 5s. per ton, according to quantity and point of delivery. Continental material on offer at £4 15s. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—At about £3 15s. per ton, f.o.r. works, or at £4 12s. 6d. per ton, f.o.b. U.K. ports.

FORMALDEHYDE, 40%.—Now quoted £33 per ton, ex store. Continental on offer at about £32 per ton, ex wharf.

GLAUBER SALTS.—English material quoted £4 10s. per ton, ex station. Continental on offer at about £3 per ton, ex wharf.

LEAD, RED.—Price now £33 per ton, delivered buyers' works.

LEAD, WHITE.—Quoted £46 per ton, c.i.f. U.K. ports.

LEAD, ACETATE.—White crystals quoted round about £39 to £40 per ton ex wharf. Brown on offer at about £2 per ton less.

MAGNESITE.—GROUND CALCINED.—Quoted £9 per ton, ex store. In moderate demand.

METHYLATED SPIRIT.—Industrial quality 64 o.p. quoted 1s. 8d. per gallon less 2½% delivered.

POTASSIUM BICHROMATE.—Quoted 4½d. per lb., delivered U.K. or c.i.f. Irish ports, with an allowance for contracts.

POTASSIUM CARBONATE.—Spot material on offer, £25 10s. per ton ex store. Offered from the Continent at £24 15s. per ton, c.i.f. U.K. ports.

POTASSIUM CHLORATE, 99½/100% POWDER.—Quoted £26 5s. per ton ex store; crystals 30s. per ton extra.

POTASSIUM NITRATE.—Refined granulated quality quoted £20 17s. 6d. per ton, c.i.f. U.K. ports. Spot material on offer at about £20 10s. per ton ex store.

POTASSIUM PERMANGANATE B.P. CRYSTALS.—Quoted 5½d. per lb., ex wharf.

POTASSIUM PRUSSATE (YELLOW).—Spot material quoted 7d. per lb. ex store. Offered for prompt delivery from the Continent at about 6½d. per lb. ex wharf.

SODA CAUSTIC.—Powdered 98/99%, £17 10s. per ton in drums, £18 15s. in casks. Solid 76/77% £14 10s. per ton in drums, £14 12s. 6d. per ton for 70/72% in drums, all carriage paid, buyer's station, minimum four-ton lots. For contracts 10s. per ton less.

SODIUM BICARBONATE.—Refined recrystallised, £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—Quoted 3½d. per lb., delivered buyer's premises, with concession for contracts.

SODIUM CARBONATE (SODA CRYSTALS).—£5 to £5 5s. per ton, ex quay or station; powdered or pea quality, 27s. 6d. per ton extra. Light soda ash, £7 13s. per ton, ex quay, minimum four-ton lots, with various reductions for contracts.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £8 17s. 6d. per ton, ex station, minimum four-ton lots. Pea crystals on offer at £14 15s. per ton, ex station, minimum four-ton lots.

SODIUM NITRATE.—Chilean producers now offer at £10 2s. per ton, carriage paid, buyer's sidings, minimum six-ton lots, but demand in the meantime is small.

SODIUM PRUSSATE.—Quoted 5½d. per lb., ex store. On offer at 5d. per lb., ex wharf, to come forward.

SODIUM SULPHATE (SALTCAKE).—Prices, 55s. per ton, ex works; 57s. 6d. per ton, delivered for unground quality. Ground quality 2s. 6d. per ton extra.

SODIUM SULPHIDE.—Prices for home consumption: solid 61/62%, £10 per ton; broken, 60/62%, £11 per ton; crystals 30/32%, £8 2s. 6d. per ton, all delivered buyers' works on contract, minimum four-ton lots. Special prices for some consumers. Spot material 5s. per ton extra. Crystals 2s. 6d. per ton extra.

SULPHUR.—Flowers, £12 per ton; roll, £10 10s. per ton; rock, £9 5s. per ton; ground American, £9 5s. per ton, ex store.

ZINC CHLORIDE 98%.—British material now offered at round about £20 per ton, f.o.b. U.K. ports.

ZINC SULPHATE.—Quoted £12 per ton, ex wharf.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Latest Oil Prices

LONDON, October 22.—LINSEED OIL was firm and 10s. to 2s. 6d. per ton higher. Spot, ex mill, £27; November, £24 15s.; November-December, £24 10s.; January-April, £24; May-August, £23 10s., naked, ex mill. RAPE OIL was inactive. Crude extracted, £30 10s.; technical refined, £32, naked, ex wharf. COTTON OIL was quiet. Crude Egyptian, £23 10s.; refined common edible, £28; deodorised, £30, naked, ex mill. TURPENTINE was firm. American, spot, 35s.; November-December, 35s. 3d., and January-April, 36s. 9d. per cwt.

HULL.—LINSEED OIL, naked, closed for spot at £26 5s.; October, £26; November-December, £24 15s.; January-April, £24; May-August, £23 15s.; East Indian, spot, £28 10s. COTTON OIL.—Egyptian crude, spot, £22 10s.; edible refined, spot, £25; technical, spot, £24 15s.; deodorised, spot, £27. PALM KERNEL OIL.—Crude, naked, 5½ per cent., spot, £24. GROUNDNUT OIL.—Crushed/extracted, spot, £28; deodorised, spot, £32. SOYA OIL.—Extracted and crushed, spot, £24; deodorised, spot, £27 10s. RAPE OIL.—Crushed/extracted, spot, £29; refined, spot, £31 per ton. TURPENTINE.—Spot, 37s. per cwt. CASTOR and COD unchanged. Net cash terms, ex mill.

Prices of Refined Camphor Flowers

A REDUCTION of twopence per lb. in the price of English refined camphor flowers B.P. is announced by May and Baker, Ltd., Battersea, London. Their net prices, without engagement, are now: Flowers B.P., at 3s. per lb.; ditto (28 lb.), at 2s. 11d. lb.; ditto (1 cwt.), at 2s. 10d. per lb. Special rates apply for quantities and contracts.

China Clay Trade Position

INVITED to express an opinion on the outlook for the China Clay industry on landing from the *Mauvetania* at Plymouth on Tuesday, on his return from the United States, Mr. T. Medland Stocker, managing director of the English China Clay Co., St. Austell, said that the world depression accounted for the smallness of the demand for Cornish and other China Clay. In America he found everything was dull and he could see no prospect for the moment of any material alteration.



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THE ILLUSTRATION SHOWS PART OF THE HYDROCHLORIC PLANT.

Manchester Chemical Market

(FROM OUR OWN CORRESPONDENT.)

Manchester, October 23, 1930.

CHEMICAL values on this market during the past week have been reasonably steady in almost all sections, and only in rare instances are prices on balance lower than they were a week ago. From the point of view of actual business there has been little change in the general situation. There is a moderate demand about on the whole, particularly for the leading "heavy" products, with the bulk of the transactions relating to prompt and near-date deliveries. Hope as to a gradual improvement in the cotton trade after years of depression seems to be growing, and, as pointed out here a week ago, if it materialises trade in textile chemicals should benefit.

Heavy Chemicals

There is a quiet demand about for sulphide of sodium, current values of which keep up at about £7 10s. per ton for the commercial quality material and £8 10s. for the 60-65 per cent. concentrated solid. Prussiate of soda is steady at from 4½d. to 5½d. per lb., according to quantity, a moderate weight of business being put through. Inquiry for chlorate of soda at the moment is on narrow lines, and at £23 to £23 10s. per ton values are not too strong. Saltcake meets with a quietly steady demand, with offers at up to £3 per ton. Caustic soda maintains its firmness and a fair movement of this material is reported, with contract offers at from £12 15s. to £14 per ton, according to quality. Only a relatively slow trade continues to be done in the case of phosphate of soda, prices of which are fairly steady at the moment at from £10 to £10 10s. per ton for the dibasic. Alkali is unchanged in price at round £6 per ton, and a quietly steady business is passing. Hypo-sulphite of soda is quoted still at about £15 per ton for the photographic grade and £9 for the commercial, but only moderate sales are being made. Bicarbonate of soda is steady at round £10 10s. per ton and a fair demand is reported. Bichromate of soda is in moderate request and quotations for this material keep up on the basis of 3½d. per lb., less discounts of 1 to 3½ per cent., according to quantity.

Caustic potash in some instances is being offered at down to about £28 per ton, with sales on moderate lines. There is a fair demand about for yellow prussiate of potash, values of which are steady at from 6½d. to 7½d. per lb., according to quantity. The price position of carbonate of potash has shown little further change on balance, current offers being at from £24 10s. to £25 per ton. Bichromate of potash is steady and in moderate request at 4½d. per lb., less 1 to 3½ per cent. Permanganate of potash meets with a quiet sale, but values in this section are still at about 5½d. per lb. for the commercial material and 5½d. for the B.P. Chlorate of potash is rather easy in tendency at round £24 10s. per ton, and no big weight of business is going through in this section.

A moderate demand has been reported in the case of arsenic, offers of which range from £17 to £17 5s. per ton at the mines for white powdered, Cornish makes. Sulphate of copper is practically unchanged on balance at about £21 per ton, f.o.b., but the price outlook in this section is still far from certain. There is not much doing in the acetates of lime, but values have been maintained at about £7 5s. per ton for the brown quality and £14 for the grey. The lead products are in quiet demand at £29 per ton for nitrate and £35 and £34 for the white and brown acetates.

Acids and Tar Products

There has been little further change in the position of tartaric acid, prices of which are at 11d. to 11½d. per lb., with a moderate business reported. Citric acid is maintained at round 1s. 6d. per lb. Acetic acid meets with a quietly steady demand at round £37 per ton for the commercial 80 per cent. quality and from £47 to £51 per ton for the glacial. Oxalic acid is quiet and somewhat easy in tendency at about £1 11s. 6d. per cwt., ex store.

A moderate business is being put through in pitch, with offers at about 45s. per ton, f.o.b. Creosote oil is fairly steady at up to 4½d. per gallon, naked, at works, with buying interest rather better. Solvent naphtha is quoted to-day at about 1s. 3d. per gallon, naked, with sales on moderate lines. Carbolic acid is quiet at 1s. 7d. to 1s. 8d. per gallon, naked for crude 60's, and up to about 7d. per lb. f.o.b. for crystals.

Company News

SOLIDOL CHEMICAL CO.—The directors announce that no dividend will be paid on the preference shares for the period to September 30 last.

BROKEN HILL PROPRIETARY CO., LTD.—Cable advice from the head office in Melbourne announces that in view of present depression in industries and the uncertainty of the outlook, the board has decided not to pay a half-yearly dividend. No payment was made at this time last year, and in April last the directors stated that they were unable to declare the usual half-yearly dividend in view of the prolongation of the coal trouble on the Newcastle (N.S.W.) field.

ELECTROLYTIC ZINC CO. OF AUSTRALASIA, LTD.—The report for the year ended June 30, 1930, states that after transferring £145,000 to depreciation reserve, the gross profit was £370,739, and net profit £283,015, against £464,697 and £367,918 respectively for 1928-29, and £171,406 was brought forward. There was appropriated to debenture sinking fund reserve the sum of £12,100 and towards development and new plant for West Coast mines £25,000, against £30,000. Dividend Nos. 16 and 17 absorbed £312,000. The balance carried forward was £105,321. Since the close of the period dividend 18, absorbing £104,000, has been paid on all preference and ordinary shares.

BRYANT AND MAY, LTD.—The directors have declared a dividend at the rate of 7 per cent., less tax, on the preference shares, and interim dividends of 6 per cent., free of tax, on the ordinary shares and of 5 per cent., free of tax, on the partnership shares, all in respect of the half-year ended September 30, 1930, and payable October 31. A similar announcement was made at this time last year, and the total distribution for the year to March 31, 1930, were 25 per cent., tax free, on the ordinary shares and 10 per cent., tax free, on the preference shares, as in 1928-29. The ordinary payment in 1928-29 was accompanied by a capital bonus of 18.15 per cent. on ordinary shares.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal" have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

EUROPE.—A British firm, with branch offices in France, Belgium and Switzerland, desires to obtain export agencies for Western Europe for British manufacturers of industrial chemicals, essential oils and drugs. (Reference No. 351.)

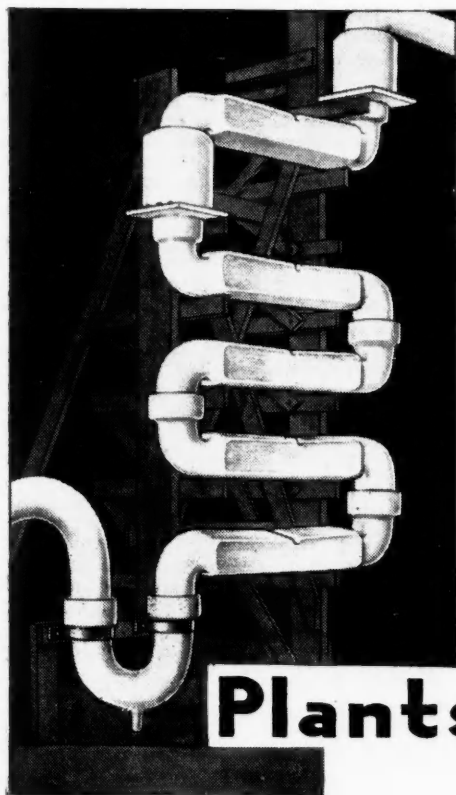
CANADA.—Merchants in Montreal, handling iron, steel and heavy chemicals, desire to obtain the representation in Canada of manufacturers of heavy chemicals, particularly those for the pulp and paper industry (soda ash, caustic soda, sulphate of alumina, china clay, and bleaching powder). They are also open to consider agencies for metals. (Reference No. 359.)

GERMANY.—The representation of British exporters of fish and bone meal and other feeding stuffs is sought by a Hamburg agent. (Reference No. 370.)

SWEDEN.—A Stockholm agent wishes to represent manufacturers of chemical goods in Sweden. (Reference No. 376.)

Some Unemployment Fallacies

COLONEL JOSIAH WEDGWOOD, M.P., at the Individualist lunch at the Victoria Hotel, on Wednesday, speaking on "The Fallacies of Some Cures for Unemployment or How Not to Do It," said that vice and error were common to all government parties and most statesmen. Their pet schemes for improving trade and reducing unemployment were put forward under the assumption that things could not be made worse, and all results, beyond those immediately obvious to a ten-year-old infant, were disregarded. Schemes of wage subsidies, protection, bulk purchase and control and many others were denounced by Colonel Wedgwood, who finally put forward as a basis to the solution of the problem the application of labour to the land. A vote of thanks to the speaker was proposed by Sir Felix Brunner.



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Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette, &c.

Company Winding Up

METAL, ORE AND CHEMICAL CO., LTD., Old Trinity House, 5, Water Lane, London, E.C.3. (C.W.U., 25/10/30.) Winding up order, October 14.

Companies Winding Up Voluntarily

LONDON SILK DYERS, LTD.* (C.W.U.V., 25/10/30.) By reason of its liabilities, October 8. F. W. le B. Lean, of Viney, Price and Goodyear, Empire House, St. Martin's-le-Grand, London, E.C.1, chartered accountants, appointed as liquidator.

SOUTH AMERICAN MANGANESE CO., LTD. (C.W.U.V., 25/10/30.) By special resolution October 10. F. H. Agar, F.C.A., of Hope, Agar and Co., Pinners Hall, Austin Friars, London, E.C.2, appointed as liquidator.

WEST CARCLAZE CHINA CLAY CO., LTD. (C.W.U.V., 25/10/30.) By special resolution October 13. J. W. Shaffery, chartered accountant, 11A, Fore Street, St. Austell, appointed as liquidator.

Mortgages and Charges

[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debt due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]

NATURAL PRODUCTS, LTD., London, E.C., drug manufacturers. (M., 25/10/30.) Registered October 9, £2,000 debenture to E. G. Fleming, Brambridge Lodge, Basingstoke; general charge.

PETROLEUM REFINERIES, LTD., London, S.W. (M., 25/10/30.) Registered October 11, 2nd debenture securing all moneys now or from time to time owing on current or other account, to Gresham Trust Ltd., Basildon House, Moorgate, E.C.; general charge. *£26,198. August 21, 1930.

Satisfaction

VICTORIA OIL AND REFINING CO., LTD., London, N.W. (M.S., 25/10/30.) Satisfaction registered October 7, £7,000 and £7,000, registered July 20, 1928.

New Companies Registered

GENZYME, LTD., Barking Guano Works, Barking, Essex. Registered October 18. Nominal capital, £10,000 in £1 shares. Manufacturers and distributors of, and dealers in, artificial, chemical or natural fertilisers or fertilising agents of all kinds, makers and rectifiers of sulphuric acid and sulphate of ammonia phosphate grinders, manufacturers of ammonia-fixed or dissolved guano and other fertilisers, etc.

RATCLIFFE ESTATES, LTD. Registered as a "private" company on October 13. Nominal capital, £1,000 in £1 shares. The objects are to acquire and hold shares, debentures, debenture stock and other interests in any companies whose undertakings may appear capable of being carried on more beneficially in co-operation with one another, or with the company, to carry on the business of manufacturers and distillers of, and dealers in, ammonia and tar, manufacturers, carbonisers, distillers or manipulators of coke, coal, tar, pitch, oxides, ammoniacal liquor and mineral and chemical substances, colliery proprietors, coke manufacturers, etc. A subscriber, G. Crow, 56, Bayswater Terrace, Leeds.

THE CREOSOTE MARKETING CO., LTD., 4, Lloyd's Avenue, London, E.C.3. Registered as a "private" company on October 20. Nominal capital, £100 in 10s. shares. To buy, sell, export, import and deal in creosote, to make arrangements and enter into agreements with producers of pitch and creosote or any such products for the sale and marketing thereof, etc.

UNISOLVA, LTD. Registered October 20. Nominal capital, £2,000 in 1,900 ordinary shares of £1 each and 2,000 deferred shares of 1s. each. To acquire from N. E. Willis patent No. 321729, for an improved process for washing wool and other textile materials and compositions for use therefor; to manufacture and deal in all substances, chemicals and things capable of being used in the manufacture of any soap, solvent, cleaning material, detergent, composition for fire extinguishing, medicines, drugs, and any ingredients thereof, dealers in oils, textile materials, rubber, latex, vulcanising materials, rubber solvent, etc. Directors: N. E. Willis, Lyngarth, Gawthorpe Avenue, Bingley; T. H. Bedford.

New Chemical Trade Marks

Applications for Registration

These lists are specially compiled for us from official sources by Gee and Co., Patent and Trade Mark Agents, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information may be obtained, and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks and Designs.

Opposition to the registration of the following Trade Marks can be lodged up to November 22, 1930.

VIVERAL

515,789. Class 4. Raw, or partly prepared, vegetable, animal, and mineral substances used in manufactures, not included in other classes. Kalle and Co., Aktiengesellschaft (a Joint Stock Company incorporated under German law), 23, Rheinstrasse, Biebrich-on-Rhine, Germany; manufacturers and merchants. September 2, 1930.

DUOVANIL

515,895. Class 1. Chemical substances used in manufactures, photography or philosophical research, and ant-corrosives. W. J. Bush and Co., Ltd., 28, Ash Grove, Hackney, London, E.8; manufacturing chemists.—September 8, 1930. To be Associated with No. 515,896 (2,743) xlii and another.

ZALDECIDE

516,484. Class 2. Chemical substances used for agricultural, horticultural, veterinary and sanitary purposes. Newton, Chambers and Co., Ltd., Thorncliffe Ironworks and Collieries, near Sheffield; manufacturers. October 1, 1930.

ERGODEX

515,019. Class 3. Chemical substances prepared for use in medicine and pharmacy. The British Drug Houses, Ltd., 16 to 30, Graham Street, City Road, London, N.1; wholesale druggists. August 1, 1930. To be Associated with No. 493,708 (2636) and another.

WINNER

515,010. Class 4. Dyes (not mineral and not for toilet purposes). Whitaker and Co. (Kendal), Ltd., Colour Works, Old Shambles, Kendal, Westmorland; dye manufacturers.—July 31, 1930. To be Associated with No. 515,009 (2,743) i.

NOVOSTAB

515,873. Class 3. Chemical substances prepared for use in medicine and pharmacy. Boots Pure Drug Co., Ltd., 37, Station Street, Nottingham; chemists and druggists.—September 5, 1930. To be Associated with No. 424,941 (2,307) and another.

NUFLAV

515,874. Class 3. Chemical substances prepared for use in medicine and pharmacy. Boots Pure Drug Co., Ltd., 37, Station Street, Nottingham; chemists and druggists.—September 5, 1930.

WINNER

515,009. Class 1. Mineral dyes. Whitaker and Co. (Kendal), Ltd., Colour Works, Old Shambles, Kendal, Westmorland; dye manufacturers.—July 31, 1930. To be Associated with No. 515,010 (2,743) iv.

Tariff Changes

AUSTRALIA.—By decisions of the Commonwealth Department of Trade and Customs, Benzyl benzoate when put up as a medicine is now subject to a duty (British Preferential Tariff) of 30 per cent. *ad val.*; Monolite Fast Scarlet, R.N., Toluidine, Toner Lake 52,503, and similar dyes in paste form, are free; and electric melting furnaces pay 27½ per cent. *ad val.*

POLAND.—The Customs duty on imported potash has been increased from 13 to 20 zloty per 100 kilograms as from October 13.

